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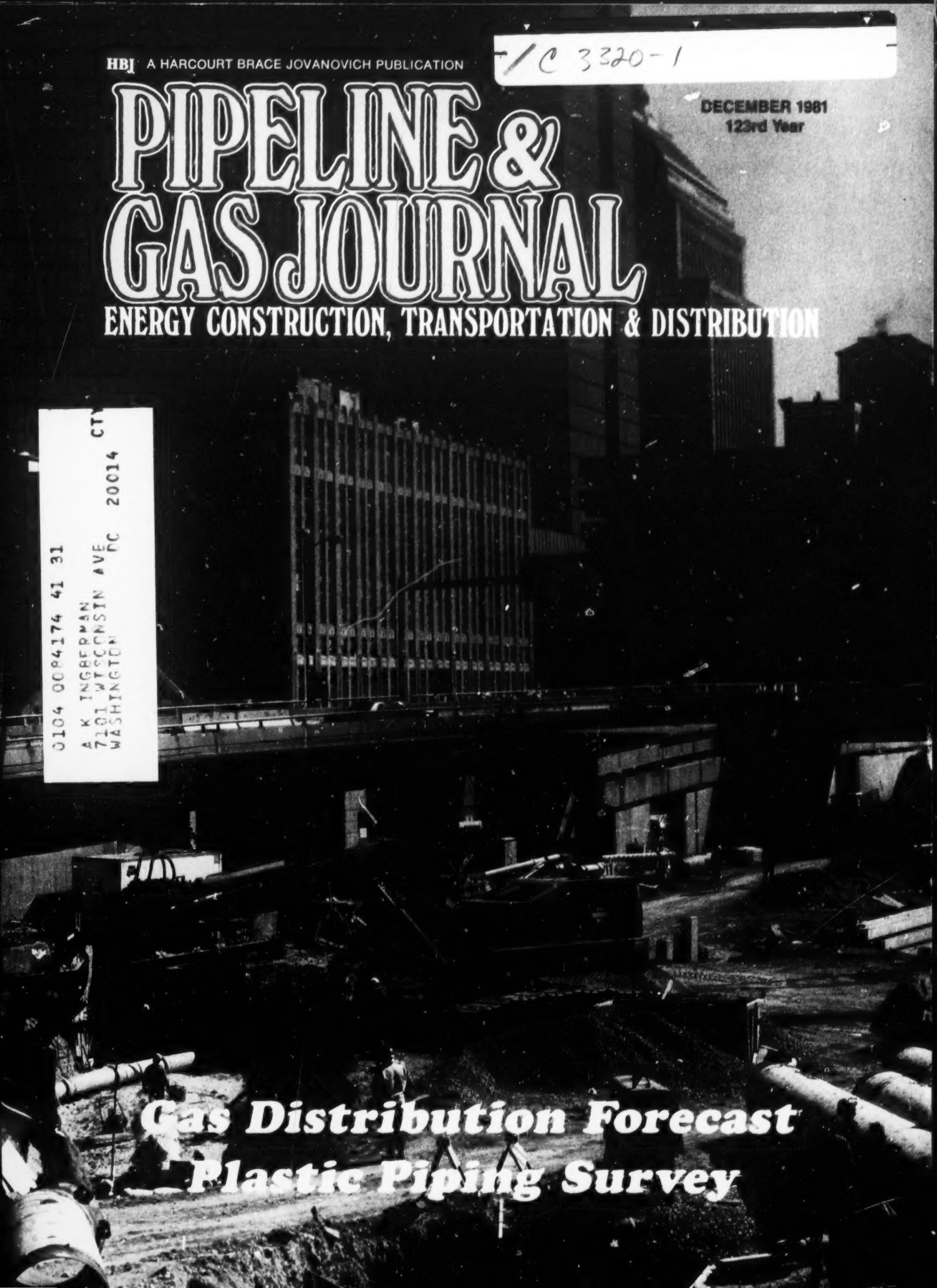

Gas Distribution Forecast

Plastic Piping Survey

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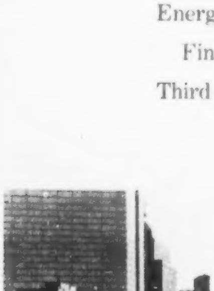

COVER

Pipelining in a big and historic city such as Boston is considerably different from conventional cross-country pipelining; how it differs and other details of pipeline work at Copley Square project are reported in this issue.

—Photograph courtesy of Bond Brothers, Inc.

New and replacement mains and services are needed to adequately serve the 48.8 million U.S. gas customers, as the nation's gas utilities expect to spend $2.651 billion to bring gas to homes, businesses, and factories in 1982.

Distribution Forecast

Gas Utility Piping Outlay To Top $2.65 Billion In 1982

by Dean Hale, *Editor*

Gas distribution utilities in the U.S. set a record in 1981 for capital expenditures for gas piping by spending a total of $2,406,258,480 – and by adding 685,000 new customers, many of them conversion customers from fuel oil or electricity, to boost the national gas customer total to 48,800,000.

While it was a record year in terms of dollar expenditures – up 34.7% over the sum spent in 1980 – the nation's 1560 gas utilities added 24,723 miles of mains and service lines, down 11.6% from the 1980 totals, a decline attributed to a continuing decline in new housing starts.

For 1982, the projection is for a 10.3% increase in capital expenditures – to $2.651 billion – to provide the facilities for adding an estimated 500,000 to 600,000 new customers during the year and to provide facilities for system upgrading and maintenance.

As revealed by PIPELINE & GAS JOURNAL's 16th annual survey of gas distribution utilities, the gas distribution utility industry spent $1.524 billion for new and replacement mains and service lines in 1981, and spent $881 million for maintenance of system duing the year. Those expenditures produced 11,535 miles of new and replacement gas mains and 13,188 miles of new and replacement gas service lines.

The 1982 projection, for 25,167 miles of mains and services to be installed, is 1.7% above the amount installed in 1981, while expenditures increase 10.3% over 1981 outlays. The rapidly increasing costs reflect an unceasing inflationary trend in labor, materials, and construction equipment.

Even though the economy slowed materially in the final two quarters of 1981, gas utilities had a generally good year in terms of new customers attached and that is reflected in the amount of new piping installed to provide that service. Biggest surprise is in the amount expended for system maintenance and upgrading – $881 million in 1981 vs. $629 million in 1980, an increase of 40%. For 1982, system maintenance expenditures will rise another 10% – $969,765,390. The 685,000 customers added in 1981 are only 83.5% of the number added in 1980, but are still considered substantial and the number is very close to the 650,000 to 750,000 estimated at this time last year.

For 1982, gas utilities expect to add about 500,000 to 600,000 more customers (assuming that new housing starts will pick up no later than the second quarter of 1982) and assuming that conversion of oil and electric customers to gas and gas heat continue at a moderate rate. With fuel oil and electricity rates still very high, and the prospects for total gas deregulation not so probable in 1982, the customer conversion prospects appear good.

During 1982, according to P&GJ's survey, 11,672 miles of new and replacement mains and 13,495 miles of new and replacement service lines will be installed. Projected 1982 expenditures are $2,651,460,490, of which $1.681 billion will be spent for new and replacement mains and services and $969 million will be spent on maintenance of system. All

Gas Distribution Utility Expenditures

	Expenditures 1980	1981	1982 est.
New and replacement mains and service lines	$1,157,005,400	$1,524,783,000	$1,681,695,100
Maintenance of system	629,100,520	881,475,480	969,765,390
TOTALS	$1,786,105,920	$2,406,258,480	$2,651,460,490

Gas Distribution Utilities Pipe Installed

	Piping Installed, Miles 1979	1980	1981	1982 est.
Gas Mains	13,319	13.573	11,535	11,672
Gas service lines ..	13,652	14,379	13,188	13,495
TOTALS	26,971	27,952	24,723	25,167

Gas Distribution Utilities – Pipe Installed – Total "In Ground" – As of 12-31-81

Gas Mains	831,733
Gas Service Lines	525,601
	1,357,334

Not all gas lines are installed in warm spring and summer months . . . here, workmen from Philadelphia Electric Co. weld pipe on new line installed in PE's service area to increase system reliability.

projections are in terms of 1981 dollars.

Data for the 1981 and 1982 expenditure and pipe mileage projections were compiled in a survey of 500 gas distribution utilities in 50 states, including the 300 largest gas distribution utilities as reported in THE P&GJ 500 (August 1981 issue). Responses on expenditures, planned installations, and operating and engineering conditions were supplied by utility management, engineering, and operating personnel.

1982 Programs A Mixed Bag

Gas utility managers and operating personnel, in addition to providing hard data on their company pipe mileage installations and dollar expenditures, also commented on their 1981 programs and what they expect for 1982. Responses to the 16th annual P&GJ survey included these comments:

"We expect 1982 activity to be about same as 1981."

"No significant increases. Plans for 1982 are for approximately same amount of activity as in 1981."

"Our construction in 1981 decreased 75% from projections, but will be up 10% in 1982."

"Our construction and maintenance programs have remained level for past four years and we expect that level to continue into and through 1982."

"We added 15,500 ft of 6-in. main in 1981; we expect to add 5500 ft more in 1982."

"We are upgrading old mains and replacing a portion of our older lines each year."

"Our expenditures up about 6% in 1981 and will be up 6% in 1982."

"We plan to attach customers at the same rate in 1982 as we did in 1981; our construction program has increased as a result of new business – about 10% per year."

"No increase but we are holding about normal in terms of construction and customer additions; our area has sustained a steady rate of growth."

"We are in the middle of a 10-year program to replace our old low pressure system with a new system. One result is that we see a decline in maintenance expense."

"Construction has decreased and maintenance increased. Do not see any increase in construction for 1982."

"Our work level in 1981 for new mains and services was up 50% and for 1982 we foresee an increase of 25%."

"Expenditures in all areas are fairly constant."

Interest, Inflation Affect Programs

"Our construction program has almost come to a halt because home building is very slow; our maintenance program continues to increase materially as our system is old and much of it is unprotected steel that we are replacing."

"Customer contributions in aid to construction have been increased; any necessary maintenance is being done."

"High interest rates have depressed new home construction and reduced subdivision development – and our need to extend our distribution system."

"New service for residential builders has slowed and higher costs have reduced the length of main/service feasible to extend to new customers; necessary maintenance has not been reduced, though."

"Our revenue is down about 10% and less construction is needed; we do have more maintenance commitments – up at least 6%."

Southern California Gas Co. crews install plastic service line to new condominium development in the Palm Springs area.

"We are performing more maintenance than ever because new construction is down drastically."

Gas Supply Problems Few

"No supply problems yet; we seek two appliances on every new service/main extension."

"Restrictions are limited by the economic feasibility of projects to add customers."

"Only restrictions on customer attachments is that we do not attach more load than our suppliers will allow gas for . . . currently have no major supply problems."

"No restrictions on connecting new customers."

"Firm customers are limited to 25 Mcf per day of connected load."

"Presently we limit to 50 Mcf per day on firm gas basis."

"Any load over 1000 cfh must be interruptible."

"We have no restrictions on residential attachments – but we do have on commercial and industrial usage."

"No problems of gas supply, and we don't expect any."

Some Procedure Changes

P&GJ asked respondents to comment on any major changes in their construction, maintenance, or repair procedures that are a result of recent federal, state or local safety regulations. Here are the answers:

"Have greatly expanded the continuing maintenance of our LNG facility."

"Now have qualification procedures for employees who make fusion joints and mechanical joints on plastic pipe."

"We now use plastic pipe for replacement services on certain steel mains; more of our steel mains are now cathodically protected and we have expanded our testing for cathodic protection interference.

"We plan to get all records on the computer for better availability and analysis."

"Heavy emphasis has been placed on maintenance of the cathodic protection system and on replacement of existing steel lines."

"Bare steel mains are being replaced at an accelerated rate."

"We have change procedures for qualifying employees and contractors who inspect and who install pipe."

"We now have improved valve maintenance, corrosion, and leak survey programs."

"We have increased staff to accommodate record-keeping and the increased number of surveys of our system. Staff is doing more in-house training."

'Wanted' New Products Listed

Respondents to P&GJ's 16th annual piping survey were also asked to list new piping products most wanted – or evolved from research. They include:

- Plastic valves with higher pressure ratings.
- Improved plastic pipe location techniques.
- Improved odorant injection techniques.
- Line stopping equipment for 4 and 6-in. plastic pipe.
- A full flow (full opening) fitting to put on mains for attaching services.
- An epoxy material (or something similar) to seal joint leaks in 25 psig cast iron piping system.
- Non-destructive testing methods for plastic fusion joints.
- Increased maximum allowable operating pressure (MAOP) for plastic pipe.
- A plastic patch repair sleeve that can be installed without shutting down the main.
- A clamp-on service saddle made of tough plastic material (such as Zytel) in sizes to 8-in. main.
- Non-metallic, non-mechanical 3 and 4-in. repair couplings.

P&GJ

Plastic Pipe Continues Phenomenal Growth

by Dean Hale, *Editor*

Plastic pipe, for the second year in a row, has accounted for over 75% of all of the pipe installed by the nation's gas distribution utilities – and for the eighth year has accounted for over 50% of all such piping. In 1981, 84.2% of the total of 24,723 miles of gas mains and services installed was fabricated of plastic. Nearly all of the 20,831 miles of plastic installed is polyethylene, according to Pipeline & Gas Journal's 16th annual gas distribution piping survey.

Responses to P&GJ's survey indicate that 109,988,960 ft of plastic pipe will be used for new and replacement mains and services during 1981. That's the second best year ever for plastic pipe (over 115 million ft were installed in 1980).

An equally good year is projected for 1982, when 20,728 miles of plastic piping are expected to be installed, approximately 82.4% of the total 25,167 miles of new and replacement mains and services to be placed in service during 1982.

Total plastic pipe installed by gas distribution utilities in the U.S. has now reached 196,630 miles, and some 933 gas distribution utilities report having used some type of plastic pipe currently or in the past. There are 70 major users – utilities having more than 750,000 ft of plastic pipe in their systems.

Overall, plastic pipe now represents 16.4% of all piping installed for utility delivery of gas.

Plastic pipe usage, expressed as a percentage of all gas distribution piping installed each year, continues to increase. The record is:

- 1966 . . . 12.0% was plastic
- 1967 . . . 13.5% was plastic
- 1968 . . . 16.5% was plastic
- 1969 . . . 19.0% was plastic
- 1970 . . . 21.2% was plastic
- 1971 . . . 24.9% was plastic
- 1972 . . . 31.3% was plastic
- 1973 . . . 42.2% was plastic
- 1974 . . . 50.6% was plastic
- 1975 . . . 55.8% was plastic
- 1976 . . . 54.5% was plastic
- 1977 . . . 72.2% was plastic
- 1978 . . . 66.9% was plastic
- 1979 . . . 69.8% was plastic
- 1980 . . . 78.0% was plastic
- 1981 . . . 84.2% was plastic
- 1982 . . . 82.4% was projected to be plastic

Usage Trends

Plastic pipe for new and replacement mains represented 48.7% of the total amount of plastic pipe installed during 1981, while 51.2% was used for new and replacement services. The remaining 0.1% found its way into other applications, such as connections for gas grills and for non-fuel-gas applications.

Of the gas companies reporting use of plastic materials, 96% are using plastic pipe for both new and replacement mains, and 95% use plastic pipe for new and replacement gas services.

Dominating the market is polyethylene, in grades 2306, 3306, 3406, and 3408 in use by 98.95% of all companies that install plastic pipe today. Only 1.4% use PVC in any size, according to P&GJ's survey, and only 0.7% use ERF pipe. No other types were mentioned in survey responses.

Size of Plastic Pipe Installed (% of Total) by Gas Distribution Utilities

Size (Inches)	% Total 1979	% Total 1980	% Total 1981	% Total 1982
1 and under	55.1	50.3	50.5	49.3
1¼ to 2	36.3	40.1	38.4	38.6
3	3.6	2.9	3.6	3.8
4	4.2	5.6	5.4	6.1
6 and over	0.8	1.1	2.1	2.2

1981 Gas Distribution Utility Usage of Plastic Pipe

Type of Installation	% of Total
New Mains	23.3
Replacement Mains	25.4
New Services	25.8
Replacement Services	25.4
Other Applications	0.1

Of the grand totals of piping installed, as compiled from survey responses, 49.1% of the plastic pipe in use is 1-in. and under in size. Another 41.9% is in the 1¼-in.-to-2-in. range, 4.9% is 3-in., 3.6% is 4-in. and 0.5% is larger than 4-in.

Plastic Use Trend Increases

P&GJ's survey in 1981 asked plastic piping users to comment on their use of the material and to note how it has changed procedures and equipment requirements for construction, maintenance, and repair. The comments included:

"We have used plastic for so long we have not had to make any recent changes except to keep up with the state of the art."

"We have used plastic since 1973 and our crews have adapted all new tools and procedures successfully."

"We now use plastic pipe exclusively for pressures under 90 psig; no problems."

"Less welding and pipe wrapping equipment needed now that we are predominantly plastic; less equipment is needed and cathodic protection requirements are less."

"We are purchasing fusion equipment as we plan to use plastic for at least 10% of all main installations."

"Have found there is a rapid transition with respect to material, equipment, and training."

"Plastic has been a boon – much simpler to use and corrosion problems do not exist."

"Joining of the pipe constitutes the major change; we have had to buy additional heat fusion tools and power generators, and train personnel in the new methods of joining pipe."

"We have had to equip the majority of our street repair crews with new tools and train them in the new techniques as a result of our using more and more plastic pipe."

"We have been using plastic since 1970, so no new changes have occurred."

"We switched to plastic several years ago; we found it reduces installation effort by approximately 20%." **P&GJ**

Profitable U.S. Operations Increase Net Income

by Cindy Mays, *Editor, ENERGY WEEK*

Earnings for the third quarter were slightly higher on the whole as oil companies with major U.S. petroleum operations experienced substantial increases in net income. Higher prices for crude oil and increased production helped Marathon Oil earn 52 percent more, while Shell Oil rose 33 percent and Atlantic Richfield went up 11 percent.

Companies with a larger stake in foreign refining and marketing operations, however, suffered losses. Because local currency price increases failed to recover the higher costs caused by a stronger U.S. dollar during most of the quarter, Mobil dropped 30 percent, Exxon, 21 percent, Standard Oil of California, 16 percent and Texaco, eight percent. Overall, U.S. petroleum earnings gained four percent while foreign petroleum earnings fell 36 percent.

The 69 oil companies who participated in our survey show a 13.1 percent increase in net income from last year. Profit margin for the group fell from 6.2 percent to 5.3 percent.

Higher Alaskan crude oil prices and improved refining and marketing operations resulted in an eight percent increase for Standard Oil Co. (Ohio).

Standard Oil Co. (Indiana) posted net earnings of $608.3 million compared to $448.9 million last year due to higher exploration, production and chemicals earnings.

Better profit margins in refining, marketing and chemicals, plus a threefold increase in North Sea oil production explained Gulf Oil's $316 million earnings, a 30 percent increase over last year.

Tenneco blamed higher interest

THIRD QUARTER NATURAL GAS COMPANIES FINANCIAL REPORTS

	Three months ending September 30**						Twelve months ending September 30**						Profit‡ Margin	
	Revenues ($000)			Earnings* ($000)			Revenues ($000)			Earnings* ($000)				
Company	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980
American Natural Resources	529,022	379,045	+ 39.6	487	(15,349)		2,821,827	2,269,818	+ 24.3	151,253	116,304	+ 30.0	5.4	5.1
Arkansas Louisiana Gas	254,726	205,914	+ 23.7	12,118	8,840	+ 37.1	1,137,029	930,883	+ 22.2	85,464	75,900	+ 12.6	7.5	8.2
Columbia Gas	713,683	573,331	+ 24.5	(148)	(3,583)		4,132,313	3,557,148	+ 16.2	176,569	157,500	+ 12.1	4.3	4.4
El Paso Companies	1,061,000	878,000	+ 20.8	39,172	8,732	+348.6	3,069,000[1]	2,615,000[1]	+ 17.4	107,848[1]	49,611[1]	+117.4	3.5	1.9
Houston Natural Gas[2]	800,617	606,450	+ 32.0	63,149	47,718	+ 32.3	2,906,310	2,357,871	+ 23.3	238,248	196,190	+ 21.4	8.2	8.3
Mountain Fuel Supply							457,287	391,048	+ 16.9	28,388	31,491	- 9.9	6.2	8.1
Northwest Energy	224,780	212,035	+ 6.0	10,778	6,462	+ 66.8	1,336,757	1,312,211	+ 1.9	63,993	49,995	+ 28.0	4.8	3.8
Pacific Lighting	801,550	668,617	+ 19.9	28,536	21,988	+ 29.8	3,227,856	2,760,221	+ 16.9	142,251	86,093	+ 65.2	4.4	3.1
Panhandle Eastern	746,133	546,623	+ 36.5	56,180	43,543	+ 29.0	3,187,659	2,303,799	+ 38.4	253,529	164,727	+ 53.9	8.0	7.2
Pioneer Corp.	310,952	234,666	+ 32.5	27,199	20,774	+ 31.9	1,139,182	880,184	+ 29.4	108,960	83,610	+ 30.3	9.6	9.5
Southern Natural Resources	598,891	375,040	+ 59.7	36,630	36,304	+ 0.9	2,369,695	1,760,992	+ 34.6	157,129	130,019	+ 20.9	6.6	7.4
Southern Union Co.	220,122	205,505	+ 7.1	69	2,147	- 96.8	1,054,522	880,291	+ 19.8	37,913	37,238	+ 7.2	3.6	4.2
Texas Eastern Corp.	1,110,982	972,934	+ 14.2	45,521	44,118	+ 3.2	4,439,326	3,985,522	+ 11.4	226,856	207,076	+ 9.6	5.1	5.2
Texas Gas Transmission	610,884	504,564	+ 21.1	25,880	18,814	+ 37.6	2,513,520	2,099,425	+ 19.7	115,863	88,741	+ 30.6	4.6	4.2
Texas Oil & Gas[3]	461,121	324,293	+ 42.2	53,115	39,824	+ 33.4	1,610,523	1,190,790	+ 35.2	191,924	141,116	+ 36.0	11.9	11.9
TransCanada Pipelines	742,164	681,281	+ 8.9	31,522	23,137	+ 36.2	3,485,765	2,995,320	+ 16.4	109,320	91,420	+ 19.6	3.1	3.1
Transco Companies	818,769	620,603	+ 31.9	28,587	25,191	+ 13.5	3,435,554	2,277,108	+ 50.9	122,786	103,161	+ 19.0	3.6	4.5
Union Gas Ltd.	149,484	115,401	+ 29.5	(4,580)	(3,723)		901,079	718,009	+ 25.5	22,504	16,651	+ 35.2	2.5	2.3
United Energy Resources	1,392,461	1,057,726	+ 31.6	49,632	38,322	+ 29.5	5,047,770	3,979,697	+ 26.8	207,278	145,500	+ 42.5	4.1	3.7
TOTALS	11,547,341	9,162,028	+ 26.0	504,047	363,259	+ 38.8	48,272,974	39,265,337	+ 22.9	2,548,076	1,972,343	+ 29.2	5.3	5.0

**Excluding non-recurring items. *Earnings available to common stock. ‡Profit Margin=Earnings* ÷ Revenues. [1]Nine months. [2]Ends July 31. [3]Ends Aug. 31.
()Loss.

rates and "the recessionary aspects of the economy" for their four percent decrease. Although energy earnings were down in the processing and marketing areas, they were offset by strong results in exploration and production.

Pennzoil's earnings from oil, gas and sulphur production were more than offset by severly depressed metals prices and continuation of lower than normal refined petroleum products margins.

Once again, non-utility oil and gas activities led gains in net income for large gas companies. Earnings for the survey group rose 38.8 percent.

A combination of expanded processing capacity and increased demand accounted for a 35 percent increase for Texas Oil & Gas.

Each of United Energy Resources' five principal subsidiaries contributed to the company's 77 percent gain, while lower utility operations earnings caused Mountain Fuel Supply to suffer a 10 percent loss.

El Paso Co. net income rose to $39.1 million from $25.4 million as a result of increased profitability of gas and oil exploration and production activities from natural gas operations.

Northwest Energy Co.'s net income rose 63 percent to $12.4 million. The increase was attributed to additional investment tax credits and allowance for funds used during construction of the 351-mile expansion of Northwest Pipeline's transmission system. ■

THIRD QUARTER OIL COMPANY FINANCIAL REPORTS

	Three months ending September 30**						Nine months ending September 30**						Profit Margin‡	
	Revenues ($000)			Earnings* ($000)			Revenues ($000)			Earnings* ($000)				
Company	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980
Alaska Interstate	88,375	57,428	+ 53.9	8,525	13,985	- 39.0	259,983	175,675	+ 48.0	32,755	42,886	- 23.6	12.6	24.4
American Petrofina	610,747	467,493	+ 30.6	21,650	28,431	- 23.9	1,990,945	1,485,014	+ 34.1	57,151	84,964	- 32.7	2.9	5.7
American Quasar	14,874	11,011	+ 35.1	721	1,139	- 36.7	42,993	32,849	+ 30.9	2,322	4,776	- 51.4	5.4	14.5
Argo Petroleum	4,374	3,558	+ 22.9	361	716	- 49.6	12,832	9,770	+ 31.3	1,594	1,553	+ 2.6	12.4	15.9
Argonaut Energy	1,728	903	+ 91.4	(234)	61		3,504[1]	1,601[1]	+118.9	(315)[1]	71[1]			4.4
Ashland Oil	2,592,876	2,213,857	+ 17.1	43,557	29,486	+ 47.7	7,475,881	6,375,947	+ 17.3	52,572	112,516	- 53.3	.7	1.8
Asamera	119,239	89,587	+ 33.1	2,542	1,487	+ 70.9	224,378[1]	169,655[1]	+ 32.3	3,088[1]	4,406[1]	- 29.9	1.4	2.6
Atlantic Richfield	6,967,639	5,636,821	+ 23.6	433,532	389,711	+ 11.2	21,067,993	16,765,447	+ 25.7	1,201,472	1,253,144	- 4.1	5.7	7.5
Beard Oil	9,013	5,227	+ 72.4	1,356	1,040	+ 30.4	25,280	15,884	+ 59.2	3,851	3,449	+ 11.7	15.2	21.7
Belco Petroleum	77,454	68,280	+ 13.4	24,088	15,927	+ 51.2	234,765	213,862	+ 9.8	71,984	47,747	+ 50.8	30.7	22.3
Burton/Hawks	1,188	685	+ 73.4	514	24	+2042.0	2,740	1,839	+ 49.0	606	26	+2231.0	22.1	1.4
Callon Petroleum[2]	3,136	2,724	+ 15.1	144	717	- 79.9	7,805	6,590	+ 18.4	1,129	1,354	- 16.6	14.5	20.5
Cities Service	2,131,800	1,635,400	+ 30.4	77,600	92,600	- 16.2	6,615,900	5,621,700	+ 17.7	225,800	369,700	- 38.9	3.4	6.6
Consolidated Oil & Gas	12,214	8,503	+ 43.6	2,015	1,172	+ 71.9	36,564	24,961	+ 46.5	5,708	882	+547.2	15.6	3.5
Crown Central	316,196	317,705	- 0.5	(5,189)	398		1,074,809	953,150	+ 12.8	(11,503)	15,279			1.6
Diamond Shamrock	820,569	773,955	+ 6.0	51,815	49,626	+ 4.4	2,503,667	2,296,690	+ 9.0	163,476	158,669	+ 3.0	6.5	6.9
Dorchester Gas[2]	230,842	154,842	+ 49.1	7,704	9,704	- 20.6	712,033[3]	608,760[3]	+ 17.0	31,287[3]	34,919[3]	- 10.4	4.4	5.7
Dyco Petroleum	12,647	8,541	+ 48.1	3,819	2,059	+ 85.5	35,423	22,254	+ 59.2	10,368	5,588	+ 85.5	29.3	25.1
Equity Oil	6,318	4,993	+ 26.5	1,393	1,248	+ 11.6	18,759	11,962	+ 56.8	4,280	3,037	+ 40.9	22.8	25.4
Exeter Oil	1,158	1,137	+ 1.8	244	326	- 25.2	3,912	3,026	+ 29.3	994	881	+ 12.9	25.4	29.1
Exxon	27,614,000	26,745,000	+ 3.2	1,075,000	1,355,000	- 20.7	85,406,000	80,622,000	+ 5.9	4,500,000	4,310,000	+ 4.4	5.3	5.3
Felmont	20,046	15,335	+ 30.7	3,762	3,764	--	56,271	42,223	+ 33.3	12,395	11,714	+ 5.8	22.0	27.7
Forest	37,818	22,414	+ 68.7	369	1,504	- 75.5	103,812	65,741	+ 57.9	3,597	4,165	- 13.6	3.5	6.3
Freeport-McMoRan Inc.	202,834	191,509	+ 5.9	44,332	49,820	- 11.0	635,650	511,230	+ 24.3	133,307	135,485	- 1.6	21.0	26.5
Getty	3,267,550	2,558,560	+ 27.7	204,931	191,555	+ 7.0	9,778,720	7,470,557	+ 30.9	639,636	659,990	- 3.1	6.5	8.8
Gulf Energy & Development	14,299	12,000	+ 19.2	1,777	1,342	+ 32.4	42,480	31,801	+ 33.6	5,067	4,739	+ 6.9	11.9	14.9
Gulf Oil Corp.	7,430,000	6,622,000	+ 12.2	316,000	244,000	+ 29.5	22,504,000	21,169,000	+ 6.3	930,000	1,103,000	- 15.7	4.1	5.2
Hadson	8,547	3,095	+176.2	4,108	1,115	+268.3	15,358	8,492	+ 80.8	6,277	2,687	+133.6	40.9	31.6
Holly Corp.[4]	99,515	97,314	+ 2.3	(1,495)	1,232		289,644	310,601	- 6.7	274	7,506	- 96.3	0.1	2.4
Inexco Oil	61,525	39,689	+ 55.0	7,533	6,037	+ 24.8	176,117	107,386	+ 64.0	22,325	17,386	+ 28.4	12.7	16.2
KRM Petroleum	1,377	1,047	+ 31.5	380	137	+177.4	4,111	3,449	+ 19.2	878	712	+ 23.3	21.4	20.6
Louisiana L&E	260,805	247,281	+ 5.5	34,479	37,510	- 8.1	881,748	770,671	+ 14.4	126,696	131,935	- 3.9	14.4	17.1
Mapco Inc.	512,398	407,266	+ 25.8	11,332	21,830	- 48.1	1,597,792	1,236,876	+ 29.2	65,776	93,291	- 29.5	4.1	7.5
Marathon Oil	2,619,658	2,028,189	+ 29.2	146,628	76,347	+ 92.1	7,177,508	6,333,450	+ 13.3	303,005	323,743	- 6.4	4.2	5.1
Marion Corp.	119,960	95,175	+ 26.0	81	6,149	- 98.7	348,422	332,280	+ 4.9	3,749	15,102	- 75.2	1.1	4.5
Mesa Petroleum	103,810	83,737	+ 24.0	23,995	16,692	+ 43.8	308,346	295,616	+ 8.0	78,259	61,257	+ 27.8	25.4	21.4
MGF	27,610	19,061	+ 44.9	2,191	1,996	+ 9.8	82,367	53,200	+ 54.8	7,239	4,703	+ 53.9	8.8	8.8
Mobil Corp.	16,845,000	15,663,000	+ 7.5	506,000	721,000	- 29.8	50,549,000	46,338,000	+ 9.1	1,846,000	2,255,000	- 18.1	3.7	4.9
Moran Energy	24,412	17,236	+ 47.4	4,812	3,480	+ 38.2	74,371	47,155	+ 57.7	14,727	8,310	+ 77.2	19.8	17.6
Murphy Oil	531,867	455,615	+ 16.7	41,123	40,914	+ 0.5	1,858,694	1,479,698	+ 25.6	124,548	104,937	+ 18.7	6.7	7.1
Natomas	404,000	325,700	+ 24.0	67,900	58,900	+ 15.3	1,140,000	952,500	+ 19.7	183,700	164,300	+ 11.8	16.1	17.2
Noble Affiliates	101,847	70,466	+ 44.5	21,918	8,558	+156.1	282,752	205,315	+ 37.7	58,309	34,107	+ 71.0	20.6	16.6
Occidental Petroleum	3,730,700	2,951,300	+ 26.4	115,800	133,700	- 13.4	10,238,200	9,296,500	+ 10.1	456,400	572,700	- 20.3	4.5	6.2
Oxoco	6,852	3,052	+124.5	1,136	538	+111.2	15,617	8,494	+ 83.9	1,924	893	+115.5	12.3	10.5
Patrick Petroleum[5]	23,912	12,222	+ 95.6	1,866	226	+725.2								
Pennzoil Co.	668,666	579,692	+ 15.3	46,445	68,649	- 32.3	2,028,769	1,823,593	+ 11.3	163,549	227,692	- 28.2	8.1	12.5
Petroleum Development	2,843	2,602	+ 9.2	(149)	72		9,306	10,966	- 15.1	464	912	- 49.1	5.0	8.3
Phillips Petroleum	3,895,148	3,224,120	+ 20.8	192,287	283,378	- 32.1	12,196,572	9,838,461	+ 24.0	692,838	782,641	- 11.4	5.7	8.0
Prairie Producing Co.	8,378	5,890	+ 42.0	1,111	882	+ 26.0	22,935	15,417	+ 49.0	2,720	2,917	- 6.7	11.8	18.3
Quaker State	251,660	214,676	+ 17.2	9,613	5,937	+ 61.9	689,736	610,427	+ 13.0	20,616	20,312	+ 1.5	3.0	3.3
Sabine Corp.	40,486	31,046	+ 30.4	6,679	6,281	+ 6.3	125,921	89,374	+ 40.9	22,714	18,134	+ 25.3	18.0	20.3
Shell Oil	5,578,000	5,135,000	+ 8.6	471,000	353,000	+ 33.4	16,545,000	14,828,000	+ 11.6	1,242,000	1,133,000	+ 9.6	7.5	7.6
Southland Royalty	100,758	75,204	+ 34.0	6,911	5,385	+ 28.3	301,085	204,934	+ 46.9	27,321	13,351	+104.6	9.1	6.5
Southwestern Energy	9,408	8,318	+ 13.1	1,717	1,291	+ 33.0	41,441	35,247	+ 17.6	9,569	7,455	+ 28.4	23.1	21.2
Standard California	11,458,000	10,509,000	+ 8.3	527,000	624,000	- 15.5	34,425,000	31,605,000	+ 8.9	1,809,000	1,786,000	+ 1.3	5.3	5.7
Standard Indiana	7,957,000	6,488,000	+ 22.6	608,300	448,900	+ 35.5	23,949,000	20,134,000	+ 18.9	1,537,800	1,513,100	+ 1.6	6.4	7.5
Standard Ohio	3,010,800	2,542,700	+ 18.4	470,000	433,400	+ 8.4	9,038,000	8,042,000	+ 12.4	1,469,100	1,335,400	+ 10.0	16.3	16.6
Sun Co.	3,700,000	3,000,000	+ 23.3	210,000	195,000	+ 7.7	11,600,000	9,100,000	+ 27.5	628,000	693,000	- 9.4	5.4	7.6
Superior Oil	499,785	376,070	+ 32.9	80,811	78,054	+ 3.5	1,496,872	1,056,975	+ 41.6	288,066	237,255	+ 21.4	19.2	22.4
Supron Energy	20,600	15,040	+ 37.0	5,300	4,362	+ 21.5	58,073	46,287	+ 25.4	15,421	13,687	+ 12.7	26.5	29.5
Tenneco	3,604,000	3,102,000	+ 16.2	141,000	146,000	- 3.4	11,249,000	9,684,000	+ 16.2	507,000	490,000	+ 3.5	4.5	5.1
Texaco Inc.	14,472,800	12,641,400	+ 14.5	589,700	636,400	- 7.3	44,731,900	38,427,600	+ 16.4	1,803,400	1,739,900	+ 3.7	4.0	4.5
Tosco Corp.	900,655	574,173	+ 56.9	19,100	9,321	+104.9	2,529,999	1,706,599	+ 48.2	(7,516)	55,933	[illegible]		3.3
Transcontinental Oil	24,968	19,615	+ 27.3	2,712	785	+245.5	71,157	56,383	+ 26.2	7,700	954	+707.1	10.8	1.7
Union California	2,871,900	2,630,100	+ 9.2	193,000	122,000	+ 58.2	8,314,200	7,757,100	+ 7.2	555,400	469,800	+ 18.2	6.7	6.1
Universal Resources[5]	16,837	8,584	+ 96.1	3,600	2,024	+ 77.8	46,425	27,497	+ 68.8	9,922	4,869	+103.8	21.3	17.7
Westcoast Petroleum	8,869	8,069	+ 9.9	1,381	1,821	- 24.2	28,434	25,351	+ 12.2	4,413	6,334	- 30.3	15.5	25.0
Wiser Oil	14,339	13,892	+ 3.2	3,250	3,174	+ 2.4	47,779	43,953	+ 8.7	13,134	11,525	+ 14.0	27.5	26.2
Woods Petroleum	16,638	14,072	+ 18.2	4,523	4,043	+ 11.9	49,069	38,920	+ 26.1	13,264	10,419	+ 27.3	27.0	26.8
TOTAL	137,225,267	121,369,176	+ 13.1	6,907,406	7,057,362	- 2.1	415,512,819	367,686,955	+ 13.0	22,218,602	22,748,099	- 2.3	5.3	6.2

**Excluding non-recurring items. *Earnings available to common. ‡Profit Margin=Earnings ÷ Revenues. [1]Six months. [2]Ends August 31. [3]Twelve months. [4]Ends April 30. [5]Ends July 31. ()Loss.

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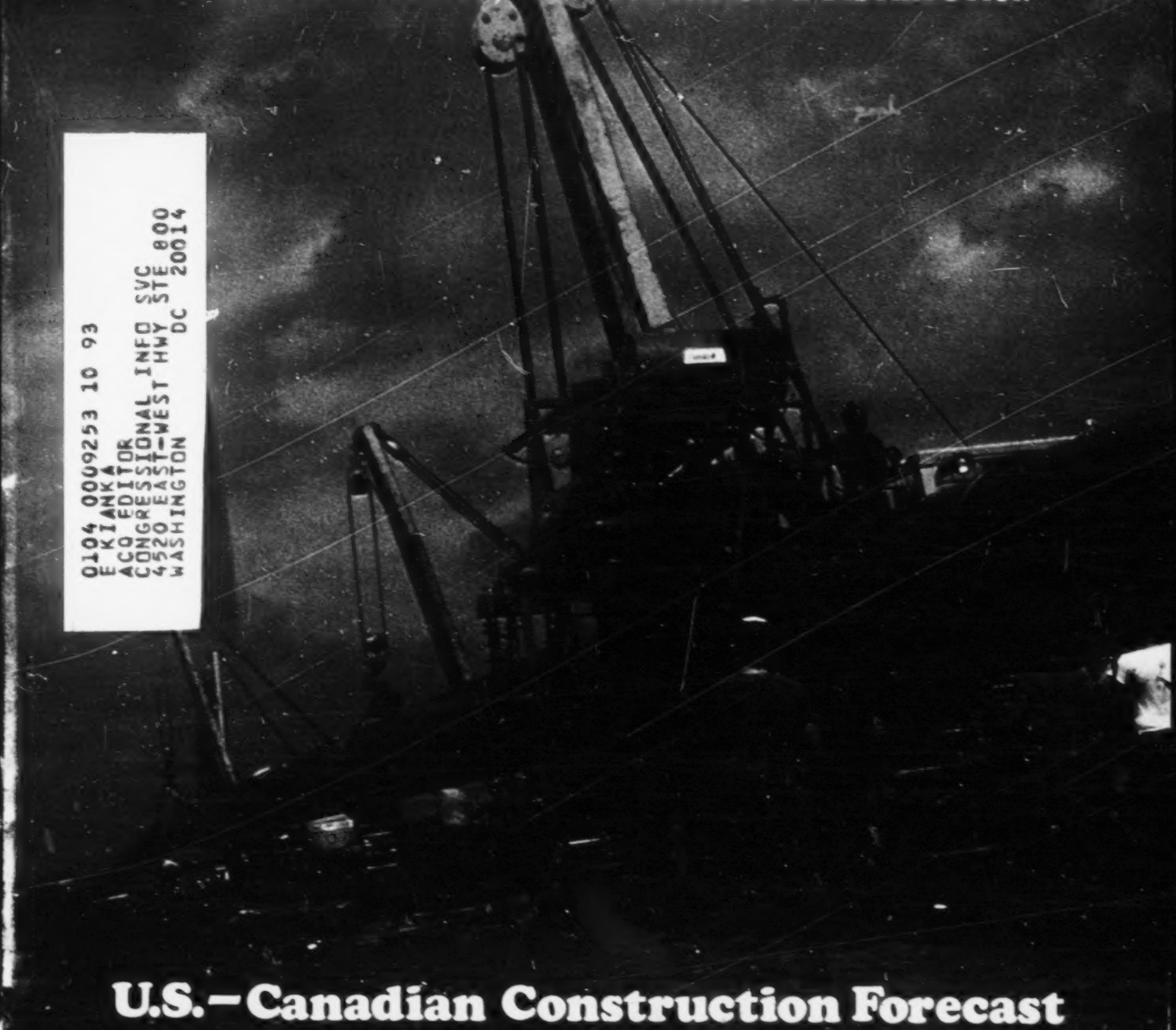

U.S.–Canadian Construction Forecast

12th Annual Contractor Roundtable

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Several major pipeline projects are expected to be built during 1982, including the first major carbon dioxide pipeline from Colorado to Texas, and contractors will continue their battles with costs and productivity; these are highlights of P&GJ's exclusive 12th annual Contractor Roundtable.

Worldwide Pipeline Work Will Continue To Be Good 24

Prospects for world pipeline construction projects are seen as good by leading international pipeline contractors who give their views on economic developments, energy trends, personnel and equipment requirements, and other needs in P&GJ's exclusive International Pipeline Contractors Roundtable.

Over 48,000 Miles Planned For U.S. and Canada Construction 28

1982 will be another good year for pipeline construction activity with over 12,000 miles to be built in the U.S. and over 2000 miles in Canada; total planned, proposed, and underway mileage in U.S. is over 35,000 miles; in Canada, over 13,000 miles.

1982 Will Be Big Year In Canada For Big-Inch Pipelining Work 36

Canadian pipeline contractors looking forward to another year of high volume in big-inch pipelining, including major work for TransCanada PipeLines, for Foothills Pipe Lines, and for Trans Quebec & Maritimes project.

Foothills Eastern Leg Work Moves At A Fast Pace 40

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Mobile Telephone/Radio Trailer Provides Emergency Communication 65

Oklahoma Natural Gas Co. uses special trailer-mounted communications center, complete with portable mast and mobile generator, to provide full communications services in event of emergencies such as tornadoes, floods, fires, civil defense, and other catastrophes.

COVER
Coating crews wrap 42-in. pipe for burial on the Northern Border Pipe Line in Montana as part of 1981's biggest U.S. pipeline project.

– photo courtesy Northern Border Pipe Line Co.

Construction Forecast

Over 48,000 Miles Planned For U.S. And Canada

by Dean Hale, *Editor* **and Jim Watts,** *Assistant Editor*

Another good year in pipeline construction activity is expected in the United States during 1982, reflecting continuing emphasis on development of energy supplies and insuring that newly-found oil and gas can be transported to market. Confident that the nation's economy will return to a healthy state after a period of adjustment, oil and gas energy producers and pipeline transporters are making plans to continue adding significant new facilities and to extend the national energy distribution system to previously untouched or lightly served areas.

As of Jan. 1, 1982, the number of pipeline projects planned, proposed, or underway reached a total of 35,167 miles. For 1982, some 12,041 miles of cross-country pipelines are expected to be installed, according to PIPELINE & GAS JOURNAL's annual U.S. Pipeline Construction Survey.

Total for the U.S. and Canada for all planned, proposed, or underway projects is a record 48,221 miles. Canada expects to have an excellent year in 1982 – for the second year in a row -- with some 2050 miles of mainline and gathering lines expected to be installed. Most of that will be large diameter gas pipeline *(see related article this issue)*.

The 11,200 miles of pipelines projected for 1982 completion is slightly less than 1981's projection, but remains an indication of the increased activity needed to meet present and future needs of the cross-country oil, products, and natural gas pipeline companies. The accompanying table provides a breakdown of all planned lines and projected completions.

Gas Pipelines

Completion of the Western Leg Construction by Pacific Gas Transmission (it went into operation in October) and much of the Eastern Leg of the Alaskan Highway Gas Pipeline Project highlighted 1981 activity. Still to be completed are some 270 miles (sections 3, 4, and 5) of Northern Border Pipeline in North Dakota – work scheduled for late spring and early summer. North Dakota is also the site of the proposed North Dakota Gathering System, 133 miles of 12 and 16-in. that would tie-in with Northern Border; United Gas Pipe Line is lead company in a group that includes Northern Natural Gas and Natural Gas Pipeline Co. of America.

Trailblazer Pipeline System is moving ahead, with 439 miles of 36-in. expected to be installed during 1982; another 358 miles of 30-in. will be built later. Another system designed to take gas from the Rocky Mountain region to the Midwest, Michigan Wisconsin Pipe Line's Pathfinder project, has been expanded and now calls for a $231 million, 634-mile 20 and 24-in. system.

The Rocky Mountain Pipeline Project (610 miles of 36-in. from Sage, Wyo., through Utah and Nevada to California) has been okayed in a federal environmental impact study. Gas would be delivered to PG&E, Southern California Gas Co., and Pacific Lighting Service Co. Line would be owned by Pacific Gas Transmission, El Paso Natural Gas, Pacific Interstate Transmission Co., and Northwest Pipeline Co. Another Rocky Mountain-oriented gas project is the Battery Limits project, involving 525 miles of 16 and 18-in. line.

In the southwest, Red River Pipe Line Co. plans to build in 1982 a 360-mile, 24-in. system from the Texas Panhandle to Southwest Texas. Ozark Pipeline, after clearing all sorts of regulatory hurdles, is underway in Oklahoma and Arkansas with 285 miles of 20-in.

In the northeastern area of the U.S., three major pipeline proposals, each designed to deliver an additional 300 million cu ft per day, are vying for that market. One, the Boundary Gas Project (owned by 14 northeastern gas utilities), would involve 261 miles of pipeline loops in Pennsylvania, New York, and the New England states by Tennessee Gas Pipeline Co. Another, New England States Pipeline Co., involves 350 miles of 36-in. line. A third project by Transcontinental Gas Pipeline Corp. would involve building 110 miles of line in northwest Pennsylvania, including a crossing of Lake Erie.

Florida Gas Transmission's plans to add 376 miles of loops on its system, to permit conversion of 890 miles of older line to products service, still awaits final approval from FERC.

Carbon Dioxide Pipelines

Shell Oil is getting underway on its planned 503-mile, 30-in. Cortez Pipeline project to bring CO_2 from natural occurring fields near Cortez, Colo., to the Denver Unit of the Wasson Field in West Texas. Pipe is being coated and construction contracts are expected to be awarded in early 1982. Amoco

1982 PIPELINE OUTLOOK

Miles Planned or Underway

Type of Line	U.S.	Canada
Natural Gas	14,628	11,213
CO_2 (Carbon Dioxide)	1,920	—
Crude Oil	3,561	924
Products	4,812	417
Slurry	10,246	500
TOTALS	**35,167**	**13,054**
GRAND TOTAL, U.S. AND CANADA	**48,221**	

Projected Completion, Miles

Type of Line	U.S.	Canada
Natural Gas	4314	
CO_2	600	
Crude Oil	424	2050
Products	926	
Slurry	—	
Oil/Gas Gathering	3727	
TOTALS	**9991**	**2050**
GRAND TOTAL	**12,041**	

Production is working on a 300-mile, 20-in. line from Bravo Dome to the Permian Basin, which might take shape in 1982, and ARCO Pipeline's Sheep Mountain Pipeline Project could also get under way in 1982.

Crude Oil Lines

Biggest news of late 1981 is that Frontier Pipeline, a subsidiary of Amoco Pipeline Co., is planning a 300-mile, 20-in. crude oil line in Wyoming that may be constructed in 1982. Getty Oil has a 70-mile, 16-in. project in California, and the U.S. Navy has underway 135 miles of 3 thru 20-in. at the Naval Reserve field in California.

The really big project – Northern Tier's 1491 mile, 40 and 42-in. line from near Seattle to Minnesota, has all of its permits but one – the vital one permitting the line to connect via a deepwater terminal in Puget Sound to tankers from Alaska and other points. Northern Tier is optimistic it will resolve the problem in 1982. If so, work could begin in late 1982 or early 1983.

Products Pipe Lines

Colonial Pipe Line reportedly is planning 240 miles of 16-in. from Augusta, Ga. to Charleston, S. C., with a branch to Savannah, plus 190 miles of 36-in. loop on its line from Baltimore to Linden, N.J. Enterprise Products Co. plans 145 miles of 8-in. LPG line in Louisiana and Mississippi; MAPCO is planning some 376 miles of 3, 6, and 8-in. extensions to its system; Provident Energy plans a 30-mile, 12-in. line near Phoenix, Ariz., and Texas Eastman Co. plans 130 miles of 8-in. from Longview, Tex. to Shreveport, La.

Slurry Pipelines

Some work on the Energy Transportation System, Inc. 1440-mile, 38-in. system may get underway in 1982. Acquisition of ROW is well underway and design plans are reportedly ahead of schedule. What happens to the other 8800 miles may well still depend on what a reluctant Congress does about the right of *eminent domain* for coal slurry lines. President Reagan has officially declined to support the *eminent domain* cause, stating that it should be up to the states to provide access.

Another smaller but very interesting slurry pipeline project may get underway in Utah and Wyoming in 1982. Chevron Chemical Co. reportedly is planning an 80-mile slurry line between Vernal, Utah, and Rock Springs, Wyo. to transport phosphate for use in a petrochemical plant. **P&GJ**

Planned And Proposed Pipeline Projects

U.S.—Natural Gas Pipelines

COMPANY	MILES	SIZE (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS/NOTES
Adobe Gas	80	N A	Toole, Liberty & Hill cos., Mont.		—	Planned	
Algonquin Gas Transmission	21.1	30	Lambertville, N.J., area		—	Planned	
Battery Limits Project	525	16 & 18	Western N. Dakota	Duluth, Minn.	—	Planned	
Colorado Interstate Gas	202	30					
	50	26	Wyo., Colo., Kan., Okla.		145	Planned	
	48	20					
	110	30					
	70	16	Cheyenne, Wyo.	Latigo Junction, Colo.	85.7	Planned	
	1.7	12					
Columbia Gas Transmission Co.	26	8	Clay, Owsley, Lee, & Estill cos., Ky.		—	Planned	
	347	2-26	Ohio, N.Y., Pa., Md., Ky		—	Planned	
	103.7	24	Pa.		56	Planned	
	7.3	16	Orange County, N.Y.		2.9	Planned	
	54.2	4, 6, 8, 12	Pa. & N.Y.		10.5	Planned	
Columbia Gulf Transmission	12.9	10-16	Ship Shoal area, offshore La.		—	Planned	
	21	6-12	Offshore La.		9	Planned	
	11	6	Eugene Island area, offshore La.		—	Planned	
	5	12 & 16	Offshore La.		—	Planned	
	127.7	10, 12, 30	Eugene Island, West Cameron areas, offshore La.		—	Planned Planned	w/Natural Gas P/L of America
	9.71	10	Vermilion area, offshore La.		4.3	Planned	
	10.1	22	Uinta County, Utah		5	Planned	
	3.8	20	South Pass area, offshore La.		4.8	Planned	Southern Natural, 20%
Consolidated Gas Supply Corp.	7.5	20	High Island area, offshore Tex.		8.1	Planned	
	63	30	Canton, Ohio	Ohio River	—	Planned	
Corpus Christi Oil & Gas	250	24	North Padre Island	Sabine Pass	—	Planned	
Eastern Shore Natural Gas	5	10	Dover, Del.	Harrington, Del.	1.3	Under Construction	Veshall Bros. Welding
El Paso Natural Gas Co.	119.8	6, 20, 24	Eddy County, N.M.		—	Planned	
	9.9	12	Ocotillo Pipeline, Ariz.	Maricopa Co., Ariz.	2.7	Planned	
Florida Gas Transmission	375.8	4, 20, 26, 30	Zachary, La.	Ft. Lauderdale, Fla.	—	Planned	Loops
	42.2	4, 6, 12, 14	Lines in Florida		10	Planned	
	4.7	26	Lines in Louisiana		6	Planned	
	1.0	6	Lines in Mississippi		0.25	Planned	
Galaxie Industries	22	10	Lamar & Fayette cos., Ala.		—	Planned	
Great Lakes Transmission	30.1	36	Minnesota		18.7	Planned	
	365	20	Mercer Co., N.D.	Thief River Falls, Minn.	—	Planned	From Great Plains Gasification Plant
	125	36	Minn., Mich., Wisc.		—	Planned	
	30.8	36	Minn., Wisc.		25.9	Planned	
Gulf States Utilities	110	½-8	East Baton Rouge Parish, La.		1.5	Planned	
High Island Offshore System	66	36	Offshore Tex.		101	Planned	
Houston Pipe Line Co.	10	4 & 12	Harris County, Tex.		12	Planned	
	5	24	Harris County, Tex.		3	Planned	
Kansas-Nebraska Natural Gas	22.3	16	Lexington, Neb.	Riverdale, Neb.	2.5	Planned	
	18.1	16	Cairo, Ill.	Grand Isle, Neb.	2.1	Planned	
	190	4 & 6	Colo., Mont., Wyo.		8	Planned	
Louisiana Intrastate Gas Corp.	55.3	16	South Pass area, offshore La.	Barataria Bay, La.	—	Planned	
Louisiana Gas Pipeline Corp.	25.8	36	Bayou Sale, La.	Napoleonville, La.	36.8	Planned	
Michigan Consolidated Gas	77	N/A	Taggart Storage Field, Mich.		40	Planned	
Michigan Wisconsin Pipe Line co.	634	24	Fremont Co., Wyo.	Greenburg, Kan.	231	Planned	Pathfinder Pipeline
	63.2	12, 24, 30	Offshore La.	Onshore La.	73.9	Planned	
	3.5	10	Offshore Tex.		4.9	Planned	
	49	12 & 20	Tex., Okla., Kan.		16.5	Planned	
	81.4	36 & 42	La., Ind., Ky., Miss.		52.2	Planned	
	12.1	42	Ind., Mich.		15.9	Planned	
	66	36	Offshore Tex.		101	Planned	
	15.3	30	Lowrey, La.		—	Planned	
	39	20	Offshore La.	Cameron Parish	60.4	Planned	
	1.8	8	West Cameron area, Offshore La.		4.1	Planned	
	61	16	Kan., Okla., Tex.		29.5	Planned	
	24	20					
	1.8	16	Kiowa Co., Kan.		1.8	Planned	Southern Natural, 20%

U.S.—Natural Gas Pipelines

COMPANY	MILES	SIZES (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS/NOTES
Natural Gas Pipeline Co. of America	14.2	8	High Island area, Offshore Tex.		—	Planned	
	222	4 & 10	Colo. & Neb.		36	Planned	
	16	6-12	Offshore Tex.		13.5	Planned	
	4.9	10	West Cameron area, offshore La.		3.9	Planned	FERC OK 7-81
	74.7	26 & 30	Hutchinson Cty., Tex.; Kiowa Co., Okla.; Cameron Parish, La.		58	Planned	
New England States Pipe Line	350	36	N.B.-Maine border	Burrillville, R. I.	420.3	Planned	Partners: Nova; Algonquin Gas; Transco, Texas Eastern
Northern Border Pipeline	270.5	42	North Dakota (Sections 3-4-5)		—	U/C	Reading & Bates Constr. H. C. Price Pipeline Majestic Wiley Contr. Reidel Int'l — rivers.
	308	42	Ventura, Iowa	Dwight, Ill.	900	Planned	
North Dakota Gathering System	113	16	Billings, Dunn, McKenzie, & Williams Cos., N.D.		64	Planned	United Gas P/L; Natural P/L of America; Northern Natural — connects with Northern Border.
	20	12					
Northern Natural Gas Co.	40	4-12	Batesville, Tex.	LaPryor, Tex.	—	Planned	
	13	6 & 10	Offshore Tex.		—	Planned	
	42.5	24	Offshore Refugio Co., Tex.		—	Planned	
	120	4-12	Iowa, Neb., Minn.		15.9	Planned	
	4.3	10	Steel Co., Minn.		1.2	Planned	
Northwest Alaska Pipeline Co.	745	48	Prudhoe Bay	Yukon border	30,000	Planned	
Northwest Pipeline Corp.	80	6 & 12	Lincoln, Unita, & Sweetwater cos., Utah		—	Planned	
Oasis Pipeline Co.	20	10 & 12	Loving Co., Tex.		5	Planned	
Ozark Gas Pipeline Corp.	285	20	Pittsburg Co., Okla.	White Co., Ark.	118	Under Construction	Gregory & Cook; H. B. Zachry; Goldrus Contracting.
Pacific Gas & Electric	40	30	Searchlight, Nev.	S. E. Calif.	—	Planned	
	162	16-36	California		9.4	Planned	
	28	30	California		19	Planned	
	103	36	California		91	Planned	
Pacific Gas Transmission	721	42	Washington	San Francisco	—	Planned	
Panhandle Eastern Pipeline Co.	110	4-12	Wyoming		24	Planned	
	164.7	4, 6, 8, 12	Weld & Adams Cos., Colo.		37.4	Planned	
	60	4-8	Greely, Hamilton, Kearney cos., Kan.		—	Planned	
	56.6	6 & 16	Kan., Okla., Tex.		25.7	Planned	
	26.3	10 & 16	Sweetwater Co., Wyo.		3.9	Planned	
	66.3	20	Woods, Alfalfa, Major, Garfield, Kingfisher cos., Okla.		41.4	Planned	
	10.7	8 & 10	Edward, Kiowa, Pratt Cos., Kan.		4.4	Planned	
	24	4, 6, 8, 10	Major & Blaine Cos., Okla.		6	Planned	
Pioneer Natural Gas	30	2 & 8	Texas Panhandle		1.5	Planned	
Pennsylvania Water & Gas	20.5	12	Wilkes-Barre, Pa.		4.9	Planned	
Red River Pipeline Co.	360	24	Hemphill Co., Tex.	Pecos Co., Tex.	150	Planned	Texas Oil & Gas, Houston Natural Gas, ONEOK, Pioneer, Corp.
Rocky Mountain Natural Gas	41	8	DeBeque, Colo.	Piceance Creek, Colo.	—	Planned	
Rocky Mountain Pipeline System	583	36	Sage, Wyo.	Needles, Calif.	515	Planned	
Sea Robin Pipe Line Co.	5.8	12	South Marsh Island area, offshore La.		5.4	Planned	
Seagull Pipeline Co.	275	24	Cameron Co., Tex. (Offshore)	Bolivar Peninsula, Tex. (Offshore)	—	Planned	
Shell Oil Co.	40	10	Weeks Island, La.	Gibson, La.	—	Planned	
Southern Calif. LNG Terminal	63	32	Ventura, Calif.		—	Planned	
Southern Natural Gas Co.	4.8	16	Offshore La.		6.9	U/C	
	37.2	30	Jasper Co., Miss; Harris Co., Ga.		26.4	U/C	
	16.7	24	Mustang Island, offshore Tex.		18.2	Planned	
	8	6 & 10	Matagorda Island, offshore Tex.		8.8	Planned	
Southwest Gas Corp.	15.5	12	Silver Springs, Nev.	Dayton, Nev.	3.4	Planned	
	60.9	20	Lovelock LNG plant, Nev.	Wadsworth, Nev.	22.7	Planned	
Sugar Bowl Gas Corp.	13	12	Vermilion Parish, La.	LRC Terminal	6	Planned	with Esperanza Transmission
Tennessee Gas Pipeline	228	30	Penn., N.Y., New England		372.6	Planned	Boundary Gas Project
	26	12					
	7	6					
	26.3	16 & 20	Offshore La.		28.4	Planned	
	174.3	16, 24, 30, 36	Offshore/Onshore La, Tex.		274.1	Planned	with Texas Eastern
	26	26 & 36	South Pass area, offshore La.		48.8	Planned	with Columbia Gulf
	10.1	8	Mustang Island, offshore Tex	Nueces Co., Tex.	5.4	Planned	
	11.4	12 & 16	South Timbalier area, offshore La.		13.3	Planned	
	5.5	12	Monongalia Co., W. Va.		1.41	Planned	
Texas Eastern Corp.	29.5	30 & 36	Delmont, Pa.	Bechtelsville, N.J.	39.1	Planned	
	25.0	6 & 12	Vermilion area, offshore La.		18.3	Planned	
	58.5	36	St. Francisville, La.	Kosciusko, Miss.	—	Planned	
Texas Gas Transmission	10	10	Lincoln Parish, La.		1.9	Planned	
	4	12	High Island area, offshore Tex.		6.3	Planned	
	32.2	20	Cameron Parish, La.		14.5	Planned	
Texas Sea Rim Pipeline	14	14	Sabine Pass area, offshore Tex.		—	Planned	
Trailblazer System	439	36	Rock Springs, Wyo.	Beatrice, Neb.	430	Planned	Natural Gas P/L of America Colorado Interstate, Columbia Columbia Gulf, Mountain Fuel Supply — Irish has coating contract for 439 miles of 36-in.
	358	30					
Trans-Anadarko Pipeline System	635	36	Moore Co., Tex.	Monroe, La.	700	Planned	
Transcontinental Gas Pipe Line Corp.	61	24	Texas		37.8	Planned	
	20.3	36	Cameron & Calcasieu Parishes, La.		24	Planned	
	7.5	12	Louisiana		1.9	Planned	
	19	4, 8, 12	Louisiana		5.7	Planned	
	7.5	6 & 8	Offshore La.		4.7	Planned	
	4.2	6	Galveston area, offshore Tex.		2.5	Planned	
	4	10	Offshore La.		4.4	Planned	
	28.1	10 & 24	Offshore Tex.		24	Planned	
	8.5	20	Offshore Tex.		2	Planned	
	3.3	16	High Island area, offshore Tex.		5.9	Planned	
	12.9	24	Mustang Island area, offshore Tex.		16.9	Planned	FERC OK, 6-81
	88.6	20 & 24	Offshore/onshore Tex.		78.4	Planned	
	110	N/A	Lake Erie	Wharton-Leidy Storage Area	200	Planned	
	31.2	20	Offshore Tex.		9.7	Planned	
	15.3	10 & 12	Offshore Tex./La.		4.4	Planned	
	18.3	2-24	Louisiana		2.2	Planned	
	30.2	10, 20, 24	North Padre Island, Offshore Tex.	Falfurnas, TX.	75.9	Under Construction	Brown & Root
Transcontinental Gas Pipe Line Corp.	3.5	12	Highland Island offshore area, Tex.		4.4	Planned	
	13	24	Wharton Co., Tex.		6.8	Planned	
	7.8	24	Brazos area, offshore Tex.		12.2	Planned	with Columbia Gas Trans.
	8.6	16	Vermilion area, offshore La.		8.2	Planned	
	3	10	Brazos area, offshore Tex.		3.4	Planned	
	1.73	12 & 20	High Island area, offshore Tex.		11.6	Planned	
	5.2	10	Vermilion area, offshore Tex.		4.6	Planned	with Southern Natural, United Gas — FERC OK 6-81

U.S.—Natural Gas Pipelines

COMPANY	MILES	SIZES (INS.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS/NOTES
	3.9	10 & 24	Brazos area, offshore Tex.		13.5	Planned	with Columbia Gulf
	3	8	Mustang Island, offshore Tex.		3.3	Planned	
	16.7	24	Mustang Island, offshore Tex.		17.3	Planned	with Northern Natural
	.43	16	Brazos area, offshore Tex.		3.6	Planned	
United Gas Pipeline Co.	2.8	10	High Island area, offshore Tex.		4.2	Planned	
	115	30	Ft. Bend, Co., Tex.	San Jacinto Co., Tex.	81	Planned	
	25.8	36	Bayou Sale, La.	Napoleonville, La.	36.8	Planned	
	6.3	4 & 6	Slidell, La.		1.3	Planned	
	6.06	6	Shelby Cty., Tex.	Panola Cty., Tex.	—	Planned	
	11.68	8	Harrison Cty., Tex.		—	Planned	
	8.01	10					
	1.4	6	W. Cameron Area, Block 538, Offshore La.		—	Planned	
Valero Energy Corp.	45	24 & 30	Provident City, Tex.	Wharton County	41.5	Planned	
Western LNG Terminal	286	42 & 48	Pt. Conception, Calif.	Los Angeles	—	Planned	
Western Gas Interstate Co.	55	12	S. E. New Mexico	Pyote, Tex.	5.8	Planned	

U.S. — Crude Oil Pipelines

COMPANY	MILES	SIZES (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS/NOTES
Bigheart Pipeline Co.	60	2-6	Oklahoma		2.5	Planned	
Department of Energy	14	16	Eastern Ky. strategic reserve		—	Planned	
	13	20	Southern Ohio strategic reserve		—	Planned	
Grand Valley Oil Co.	180	16	S. E. Utah	Rangely, Colo.	—	Planned	
Getty Oil Co.	70	16	McKittrick, Calif.	Coalinga, Calif.	—	Planned	
La Sal Pipe Line Co. (Exxon, Texaco)	314-320	12 & 16	Parachute, Colo.	Casper & Rangely, Wyo.	100	Planned	Carry shale oil from Colony Oil Shale Project (Tosco & Exxon)
Frontier Pipeline Co.	300	20	Uinta Co., Wyo.	Casper, Wyo.	—	Planned	
New England Energy	35	24	Portland, Me.	Sanford, Me.	—	Planned	
Northern Tier Pipeline	1491	40, 42	Port Angeles, Wash.	Clearbrook, Minn.	1600	Planned	Butler (E) and Williams Brothers (E)
Northville Industries	211	30 & 36	Freeport, Tex.	Texas City-Galveston	—	Planned	Brown & Root (E)
Provident Energy Co.	204	16	Mobile, Ariz.	Kingman, Ariz.	—	Planned	1983 Construction
U.S. Navy	135	3-20	Naval Petroleum Reserve	Redland, Calif.	—	U/C	ARB inc.
Wallace & Wallace Chemical & Oil Co.	214	22-30	Mobile, Ala.	Tuskogee, Ala.	—	Planned	Ford, Bacon & Davis (E)

U.S. — Product Pipelines

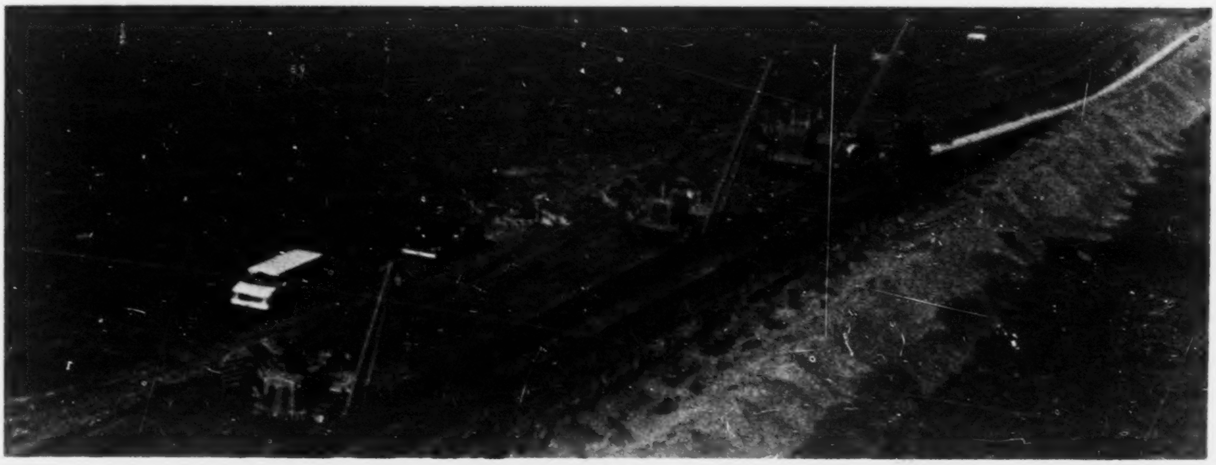
COMPANY	MILES	SIZES (INS.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS/NOTES
Ashland Pipeline Co.	74	8	East Sparta, Ohio	Heath, Ohio	—	Planned	
	5	6	Western Kentucky		—	Planned	
Alaska Interstate, Dow Chemical, Shell Chemical	800	16-20	Prudhoe Bay	Anchorage or Valdez	1200	Planned	
Barbour Energy Co.	390	20	Brownsville, Tex.	Houston	—	Planned	Ford, Bacon & Davis (E)
Big Three Industries	67	12	Victoria, Tex.	Bay City, Tex.	—	Planned	
Coastal States Crude Gathering Co.	12.8	6	East Whites Point, Tex.	Clarkwood, Tex.	—	Planned	LPG
Colonial Pipeline Co.	240	16	Augusta, Ga.	Charleston, S. Car.	—	Planned	
	190	36	Baltimore, MD	Linden, N. J.	—	Planned	
Doyon Ltd.	255	20	Prudhoe Bay	Nikishka, Ak.	1300	Planned	NGL and crude oil
	143	16					
Enterprise Products Co.	145	8	Sorrento, LA	Petal, MS	—	Planned	LPG
Exxon Pipeline Co.	66	8	Houston	Beaumont	—	Planned	
Farmland Industries	70	12 & 16	Louisiana		—	Planned	
Getty Pipeline	25	16	Delaware City, Del.	Marcus Hook, Pa.	10	Planned	
Gulf Refining	36	10 & 14	West Texas		—	Planned	
Mapco	376	3, 6, 8	Extensions to system		—	Planned	
Philips Petroleum	820	10	Williston, N.D.	Conway, Kan.	—	Planned	
Product Energy Co.	30	12	Mobile, Ariz.	Phoenix, Ariz.		Planned	1982 Construction
Seagull Petrochemical Pipeline Corp.	15	4	Norco, La.	LaPlace, La.		Planned	
Southern State Pipeline Co.	32	12	Norco, La.	Sorrento, La.		U/C	
Transgulf Pipeline	890	24	Baton Rouge, La.	Ft. Lauderdale, Fla.	140	Planned	Conversion from gas
Texas Eastman	130	8	Longview, Tex.	Shreveport, La.		Planned	FB&D (E)

U. S. — Slurry Pipelines

COMPANY	MILES	SIZES (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS/NOTES
Allen-Warner Valley Energy Systems (Nevada Power Co.)	183	20 & 24	Alton, Utah	Las Vegas, Nev.	270	Planned	
Chevron Chemical Co.	80	Unk.	Vernal, Utah	Rock Springs, Wyo.	—	Planned	Phosphate line
Coalstream Pipeline Co. (Continental Resources)	1500	24-48	Kentucky	Florida	3000	Planned	Fluor (E)
Energy Transportation Systems Inc.	1440	38	Wyoming	Baton Rouge, La.	2000	Planned	Bechtel (E)
Pacific Bulk Transportation Systems (Boeing Engineering and Construction Co.)	650	Unk.	Emory, Carbon Cos., Utah	Port Hueneme, Calif.	500	Planned	Boeing (E)
Powder River Pipeline Inc.	1923	42	S. E. Montana	Great Lakes area	1260	Planned	
San Marco Pipeline Co. (Houston Natural Gas, Rio Grande Industries)	900	20 & 24	S. E. Colorado	Texas Gulf Coast	800	Planned	
Snake River System (Northwest Energy, Gulf Interstate)	1100	20 & 24	N. E. Wyoming	Idaho, Oregon	500	Planned	
Tesoro Petroleum Corp	1000	30	Kentucky	S. E. U.S.	1000	Planned	
Virginia Power Co.	300	12-36	Proud, W. Va.	Portsmouth, Va.	250	Planned	
Wytex System (Texas Eastern, Brown & Root)	1260	36,40	Power River Basin, Wyo.	Houston area	1800	Planned	Brown & Root (E)

U.S. — Carbon Dioxide Pipelines

COMPANY	MILES	SIZES (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS/NOTES
Amoco Production Co. (Bravo Dome Pipeline)	300	20	Bravo Dome, N.E. N. Mex.	Permian Basin Field, Texas	—	Planned	In design stages
ARCO Pipeline Co. (Sheep Mountain Pipeline)	405	20	Walsenburg, Colo.	Seminole Field, Gaines Cty., Tex.	—	Planned	In design stages
	12	Various	Field lines in Colo. and Texas.				
Carbon Dioxide Technology	40	8	Lubbock, Tex.	Post, Tex.	—	U/C	Brown & Root
Highland Resources	N.A.	N.A.	Beaumont, Tex.	Orange, Tex.	—	Planned	
Northwest Pipeline Co. and Transwestern Pipeline Co.	125	N.A.	Ignacio, Colo.	Gallup, N. Mex.	—	Proposed	
Rocky Mountain CO_2	550	N.A.	Big Piney, Wyo.	Williston, N. Dak.	—	Planned	
Shell Oil Co.	503	30	Cortez, Colo.	Denver Unit at Wasson Field, NW of Midland, Tex.	—	U/C	Pipe coating underway; '82 construction.
Texaco	25	14	Luling, La.	Paradis Field	—	Planned	



1982 To Be Big Year In Canada For Big-Inch Pipelining

by L. O. Rowland, *Canadian Editor*

A second year of high volume big-inch pipeline construction is in store for Canadian contractors and may even top 1981 that has brought the first recovery of a whole decade of extreme depression in the big-inch category. The 1981 volume has topped out at about 830 miles of 24-inch and larger and included the first substantial 48-inch project since 1973.

The first project to be awarded for 1982 is the winter program of TransCanada PipeLines Ltd. in the muskeg regions of eastern Manitoba and Northwestern Ontario. The 128 miles of 42-in. loop of the existing main gas transmission line were awarded to Majestic Wiley Contractors Ltd. It is a normal winter job on frozen ground, with completion scheduled for Feb. 28, before spring breakup.

Next to come up will be the completion of the Canadian eastern leg of the Alaska Natural Gas Transmission System. Foothills Pipe Lines (Yukon) Ltd. has 128 miles of 42-in. to fill in the two gaps in the southern Alberta segment, remaining after the rest of the portion from Clearwater compressor station to the Saskatchewan boundary was laid in the 1981 summer season. Foothills will call tenders on Feb. 1, award the contract by March 1 so that the contractor can move all equipment onto the right-of-way before the spring road bans, and kick off as soon as the right-of-way is suitable for travel. There is a close completion deadline of Aug. 1 so that the whole eastern leg can be in service by Sept. 1 to coincide with the in-service schedule for the Northern Border pipeline with which the Foothills system connects at Monchy, Saskatchewan.

TransCanada plans to spend nearly $800 million additional in 1982 for two more projects which were awaiting National Energy Board approval following public hearings. One is a major looping project to continue the 1981 looping. It comprises 181 miles, made up of 115 miles of 48-inch in Saskatchewan and Manitoba, 50 miles of 42-inch in northern Ontario and 16 miles of 36-inch in Manitoba on the export lateral.

The second TCPL project is the long-planned "short cut" main line from North Bay to a point near Morrisburg on the Toronto-Montreal main line where the Ottawa lateral takes off from this line. The 253-mile, 42-in. line will be in entirely new right-of-way, cutting across on the hypotenuse of the triangle which it will form with the present main line from North Bay south to Toronto and from Toronto northeast to Montreal.

Purpose of this line is, in effect, to loop the much longer North Bay/Toronto/Montreal route in a more economical way by cutting about 100 miles off the total distance of the original line. It will also provide an express route for gas to the far eastern provinces when the T Q & M line is built, and for gas going to the northeastern states to whatever extent the large contracts signed with American pipeline companies during the past year are approved by the National Energy Board. These export proposals have yet to come to public hearing before the NEB.

Both the looping project and the new main line are planned for normal summer construction, on the assumption that the NEB will move promptly, recognizing the logistical problems of a short summer in the western provinces and the congested region in Ontario where the new pipeline passes through many heavily settled and intensively cultivated areas. Scheduled completion dates are late fall for both projects.

Trans Quebec & Maritimes Pipeline Inc. closed tenders on Nov. 23, under its alternate name Gazoduc Trans Quebec & Maritimes Inc., for the long delayed main line from Boisbriand, near Montreal, to Trois Rivieres, the first leg of the line from Montreal to Quebec City. The project consists of 92 miles of 24-inch and is planned to kick off by Jan. 15 for a scheduled completion on Nov. 1, 1982.

These five principal items add up to 785 miles. Some tentative plans by Foothills and Nova, an Alberta Corporation may materialize early enough to add another 100 miles or so. The start of 56-in. pilot construction on Foothills has been delayed officially until the winter of 1982-83, but this is not definitive and could be brought forward to the fall of 1982. Nova also has some potential in expansion of its existing system in Alberta, depending substantially on early developments in the various pending export projects.

In the small-inch category, Nova will be the leading main line builder in 1982, with a massive program of lateral gas transmission lines which could exceed 400 miles if regulatory approvals come quickly enough and producer gas contracts justify the projects.

The firm items begin with the Liege lateral, 94 miles of 10 and 12-in. to move gas from the Liege field in northeastern Alberta to a point south of the Athabasca oil sands area on an existing main gas line. Next is the Cutback lateral in the Deep Basin in the Gold Creek area of northwestern Alberta, 45 miles of 16

CANADA—Natural Gas Pipelines

COMPANY	MILES	SIZE (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS
Aquitaine Co. of Canada Ltd.	42	8, 16	Hanlan Field	Ram River Processing Plant	—	Planned	Comp. Spring 1982
Alberta Energy Co. Ltd.	300	2 to 8	Suffield Block gathering system		—	Planned	
British Columbia Hydro and Power Authority	211.8	N/A	Delta (B.C. Mainland)	Nanaimo (Vancouver Island)	231	Planned	Line to go under Strait of Georgia
Dome Petroleum	67	3 to 10	Primrose-Kirby Area	—	—	Planned	
Canadian Hunter	63	4, 6, 8, 10	Deep Basin gathering system		—	Planned	
Canadian Western Natural Gas	22	12	Okotoks	Cayley, Alta.	—	Planned	
	15	16	Priddis	Calgary	—	Planned	
Foothills Pipe Line (Alberta) Ltd.	394	56	Western Alberta		—	Planned	
	99	36	Caroline, Alta.	Crowsnest, Alta.	—	Planned	Approved by NEB; to be built later
	740	34	Whitehorse	MacKenzie Delta	—	Planned	Dempster lateral (1987 Or 1988)
Foothills Pipe Lines (North BC) Ltd.	439	56	Northern BC		—	Planned	
Foothills Pipe Lines (South BC) Ltd.	53	36			—	Planned	Approved by NEB to be built later
Foothills Pipe Lines (Sask.) Ltd.	161	42	Monchy, Saskatchewan	James River (Alberta border)	—	U/C	Majestic Wiley
Foothills Pipe Lines (Alberta) Ltd.	128	42	Southeastern Alberta		—	Planned	1982 Construction
Foothills Pipe Lines (South Yukon) Ltd.	266	48	Southern Yukon		—	Planned	
	251	56	Southern Yukon		—	Planned	
East Coast Pipelines Ltd.	1000	36	Sable Island	Montreal	—	Proposed	Techman, Ltd. (E)
Gulf Canada Resources Ltd.	155	2 to 16	Hanlan, Alta., area		—	Planned	
Hudson's Bay Oil & Gas Co.	35	4 to 6	Alberta		—	Planned	
Nova Corp.	45	16, 20	Laterals		—	Planned	
	58	6, 16, 20	Laterals		—	Planned	
Pacific Northern Gas	75	16	Nanaimo, B.C.	Comox, B.C.	75	Planned	1983 Completion
	54	12	Nanaimo, B.C.	Victoria, B.C.			
	29	6	Comox, B.C.	Campbell River, B.C.			
Pan Canadian Petroleum	210	2 to 6	Southeastern Alberta		—	Planned	
Peace Pipeline Ltd.	144		Grande Prarie	Fox Creek	—	Planned	
Polar Gas Project	3100	30, 36, 42	Melville Island	Longlac, Ont.	7000-8500	Planned	Late 80's
Saskatchewan Power Corp.	6	4	New Osgood	Zenon Park Loop	—	Planned	
Shell Canada Resources Ltd.	20	3 & 6	NW Alberta		—	Planned	
Texaco Canada Inc., CDC Oil & Gas Co.	40	10	Mildred Lake Alberta	Texaco Pilot Oil Sands Plant	—	Planned	
TransCanada Pipelines Ltd.	128	42	Eastern Manitoba (Loops)	NW Ontario	—	U/C	Majestic Wiley
	115	48	Sask. Ont., Mant. Loops		317	Planned	
	50	42					
	16	36					
	74	30	Montreal	Quebec City	—	Planned	
	26	30			—	U/C	Banister Pipelines
	253	42	North Bay	Morrisburg, Ont.	476	Planned	Ottawa Lateral
Trans Quebec & Maritimes	460	30	Levie/Lauzon (Near Quebec)	Halifax & Grace Bay, N.S.	360	Planned	Approved by NEB Aug. 1981
	600	Various	Distribution laterals in New Brunswick & Nova Scotia		—	Planned	
	92	24	Boisbriand	Trois Rivieres	—	U/C	
	1000	Various	Montreal	Quebec plus other laterals	900	Planned	
Union Gas Ltd.	22	42	Bright-Owen Sound	Kerwood-Caradoc	—	Planned	1982
Westcoast Transmission	83	12 & 24	British Columbia		—	Planned	
	41	36	British Columbia		—	Planned	
	30	6, 8, 26	British Columbia		—	Planned	

CANADA—Crude Oil Pipelines

COMPANY	MILES	SIZE (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS
Home Oil Co.	300	4-10	Grand Prarie	Swan Hills	—	Planned	
Husky Oil Operations, Ltd.	90.5	16 & 12	Cold Lake Field	Lloydminster	—	Planned	Approved; 1982 Construction
Interprovincial Pipe Line (NW) Ltd.	533	12	Norman Wells, NWT	Zama Lake, Alta.	360	Planned	NEB approval but delayed until 1985
Transmountain Oil Pipeline, Ltd.	571	30 & 36	Edmonton	U.S. Border	—	Planned	NEB approved; deferred
	30	36	Sumas Wash.	U.S. Border	—	Planned	Deferred

CANADA—Products Pipelines

COMPANY	MILES	SIZE (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS
Alberta Products Pipe Line Ltd.	192	10	Edmonton	Calgary	—	Planned	Associated-Pullman Kellogg Ltd. (E)
Hudson's Bay Oil & Gas Co. Ltd.	94	6	West Pembina	Rimbey Gas Plant	—	Planned	
Husky Oil Operations, Ltd.	90	6	Cold Lake	Lloydminster	—	Planned	1982 Construction: Algas Engr'g. Services (E)
Petro Canada Cactus Lake Project	41	N/A	Cactus Lake Field	Murphy	—	Planned	Condensate Line

CANADA — Slurry Pipelines

COMPANY	MILES	SIZES (IN.)	FROM	TO	COST ($MILLIONS)	STATUS	CONTRACTORS/NOTES
Alberta Economic Development Energy, and Natural Resources Ministries	500	Unk.	Hinton, Alberta	Pacific Coast		Planned	Fluor (E)

and 20-in. The Demmitt lateral 14 miles of 16-in. is designed to serve a new gas processing plant north of Grande Prairie in the Deep Basin. The Robb lateral from the Hanlan central foothills gas plant being built by Gulf Canada will take 24 miles of 20-in. A package of three laterals, Kirby North loop, Graham and Chard, amounts to 50 miles of eight and six-inch, in northeastern Alberta. Tenders have been called for all of these and two had been contracted up to mid November. All are winter jobs, for completion before spring, for a total of 227 miles.

Gulf Canada has a major sour gas gathering system leading into its Hanlan gas plant, for summer construction, with a total of 155 miles of 16-inch down to two-inch comprising sour gas service main lines coupled with sweet fuel gas lines and water disposal lines. Canadian Hunter proposes 63 miles of 10, 8, 6 and 4-in. in the Deep Basin. Aquitaine Company of Canada Ltd. has a sour gas lateral extension in the same area, 42 miles of 16 and 8-in. from the South Hanlan area to its Ram River gas plant. Alberta Energy Co. Ltd. plans about 300 miles of small-inch gathering lines in the Suffield Block.

PanCanadian Petroleum has a firm commitment for 210 miles of 2 thru 6-in. gathering lines in southeastern Alberta.

In product and gas liquids projects, the principal item is the long deferred looping of the entire Edmonton-Calgary products line of Alberta Products Pipe Lines Ltd. (a Gulf Canada subsidiary) with 192 miles of 10-in., which is to be re-tendered for summer construction. Hudson's Bay Oil and Gas Company Ltd. intends to build 94 miles of 6-in. LPG and condensate line from the West Pembina field to the Gulf Rimbey gas plant.

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123rd YEAR

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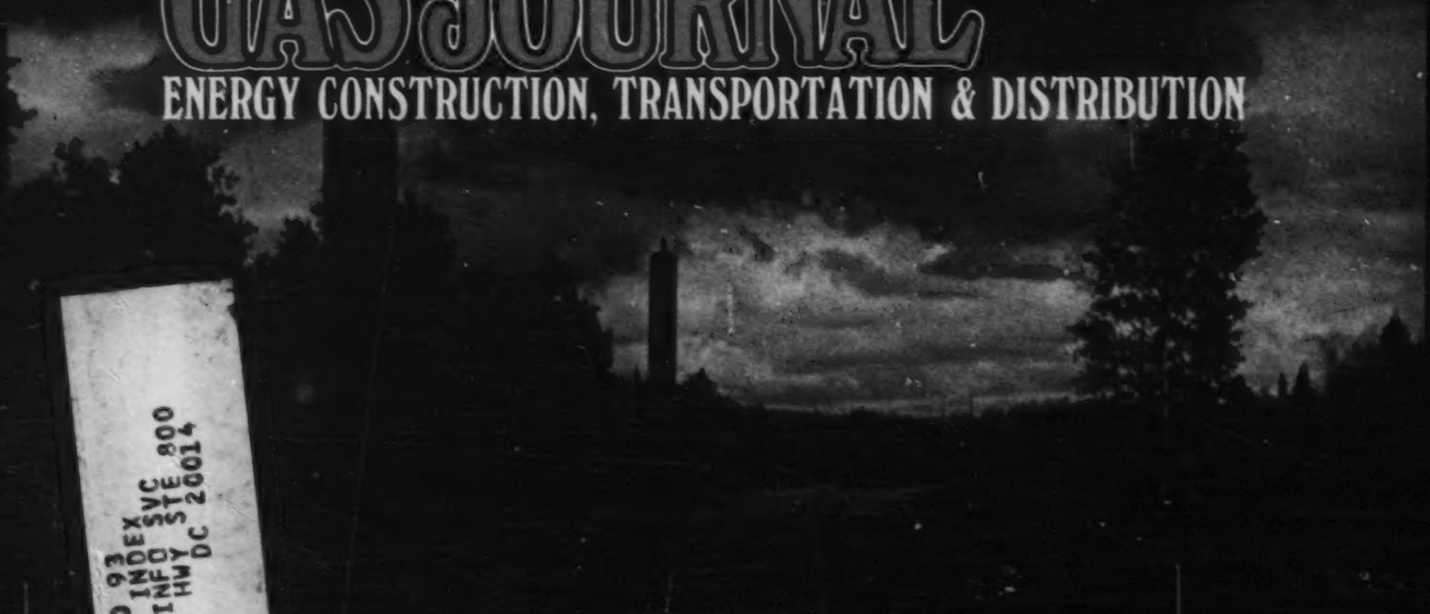

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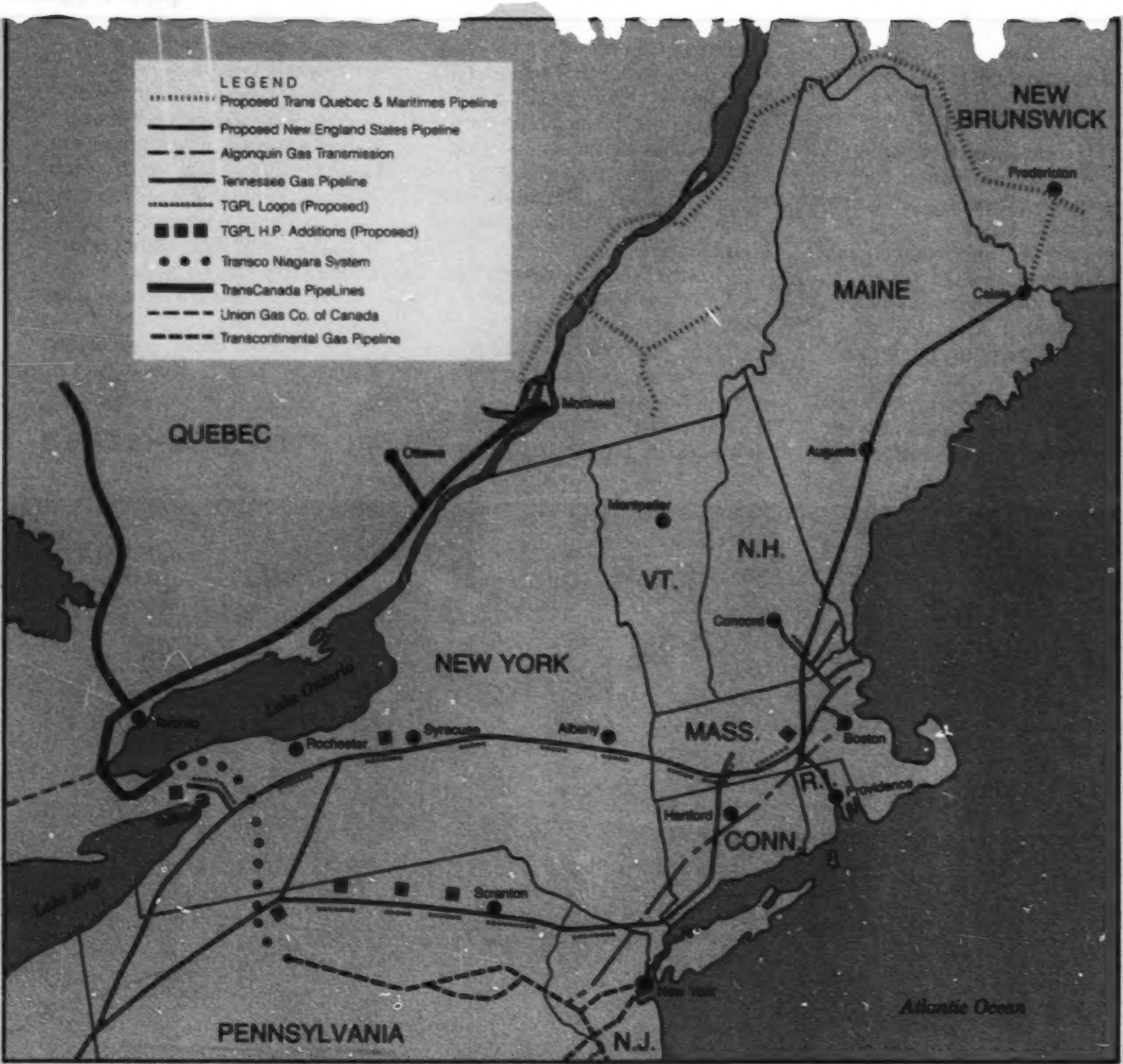
COVER
Pipeline maintenance takes many forms – such as this project to replace a faulty valve on a 30-in. crude oil pipeline in Michigan's Upper Peninsula; two Stopple® Plugging Machines were used to make bypass so line was never shut down while old valve removed and new one inserted.

– Photo courtesy T. D. Williamson, Inc.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NEW BRUNSWICK
Fredericton
MAINE
Calais
Montreal
QUEBEC
Ottawa
Augusta
Montpelier
N.H.
VT.
Concord
NEW YORK
Lake Ontario
Toronto
Rochester
Syracuse
Albany
MASS.
Boston
R.I.
Providence
Hartford
CONN.
Lake Erie
Scranton
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Atlantic Ocean
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Gas Lines Chasing Huge Northeastern Market

by **Jim Watts**, *Assistant Editor*

Gas for an energy-hungry Northeast U.S. is the driving force behind three projects to bring Canadian gas to the New England-New York area. None of them has yet made it through the double-barreled governmental review maze, where bodies from both sides of the border must approve, but by the mid-1980s at least one will be bringing millions of cubic feet of gas into the U.S. daily to heat homes, fuel industrial facilities, and provide a clean, efficient alternative to an area heavily dependent upon heating oil.

The three proposals are the New England States Pipeline (Algonquin Gas Transmission Co., Transcontinental Gas Pipe Line Corp., Texas Eastern Transmission Corp., and Nova Corp.); Boundary Gas Inc. (a consortium of 14 gas utilities with Tennessee Gas Pipeline Co. providing transportation); and Transco's proposal for a line from Niagara Falls to Pennsylvania.

Both countries stand to benefit from the projects. For Canada, the sale of gas to New England provides a steady market for massive quantities of gas, makes it economically feasible to build a pipeline from gas-rich Alberta that will serve eastern Canada as well, and ensures there will be a transportation network in the Maritimes for use when production begins off Newfoundland and Nova Scotia. For the U.S., the gas from Canada will help reduce the nation's dependence on foreign oil and provide additional supplies when, as happened last winter, cold weather strains utilities' efforts to provide enough gas.

New England States Pipeine

The New England States Pipeline, a 360-mile, 36-in. line from near Calais, Maine, to Burrillville, R.I., is a joint partnership of Algonquin Gas Transmission, Transco, Texas Eastern Transmission, and Nova Corp., each of which will have a 25% financial interest in the project. The 300 MMcf transported daily from Canada will be shared equally by Algonquin, Texas Eastern, and Transco.

The project was originally proposed as a 30-in. line but was upgraded to 36-in. prior to the filing with FERC on Oct. 9, 1981. In addition to the 360 miles of 36-in., the project calls for 65,000-hp compression at four stations. A meter and regulator stations will be built at Burrillville, where the gas enters the Algonquin system, and a regulator station at Calais, where the gas crosses the international border.

Total cost of the project is estimated at $560,778,000. Construction costs account for more than $420.3 million. Line is designed to operate at a maximum pressure of 900 lb with designed deliverability of 305,882 Mcf a day. With the addition of the four stations comprising 65,000-hp, the maximum deliverability goes up to 850 MMcfd.

William Belkin of Algonquin says the project has two purposes.

"First, it makes more gas more available," Belkin says. "Second, we think it important to get this line in place so that, when gas comes ashore from Nova Scotia and Newfoundland, the facilities will be there to allow the Canadians to take advantage of that new supply."

Pipeline's route has been determined by using the "corridor" concept (utilizing existing pipeline, highway, and railroad right-of-ways) to minimize environmental and socioeconomic problems during construction and operation, Belkin says. Aerial surveys of all routes were completed in 1979.

Assuming all regulatory hurdles are passed in a reasonable time, line could be operational by 1984. "That's an optimistic date," Belkin concedes. "That's really the earliest possible date."

Gas will be purchased from Pan-Alberta Gas Ltd. Firm has applied for a 15-year export license with an annual volume of 112 Bcf, and a total volume over the contract's lifetime of 1.8 Tcf.

Export licenses have been filed with Canada's National Energy Board for all three projects, taking their place along with at least a dozen similar applications now pending. Joint hearings are planned on all the applications for export in the first six months of 1982.

International politics are expected to be a major factor in the license review process. Relations between Ottawa and Washington were strained last year by the announcement of Trudeau's national energy policy that restricts U.S. participation in Canada's oil and gas industry. Combined with some Canadian conservationists' worries that the sales will draw down Canada's enormous gas reserves and U.S. fears that the imports will make the Northeast dangerously dependent on Canadian gas, situation is shaping up where politics could play a bigger role than the already demonstrated need for the gas.

A recent report from the NEB says there isn't enough gas in field connected to production facilities — gas treating plants and pipelines – to justify additional exports. However, the NEB's "current deliverability test" ignores the fact that companies are reluctant to expend the millions of dollars needed to provide those facilities without a guarantee that the gas has a market.

The Battle For New England Gas Supply – Summary of Proposals

Project	Miles	Sizes (in.)	Daily Volume (Mcf)	Cost (Millions)
Boundary Gas Inc.	261	10 to 42	300,000	$372.57
Niagara Pipeline	158	42	1,113,000	$402.3
New England States Pipeline	360	36	305,882	$560.78

Boundary Gas

Boundary Gas Inc. was born out of necessity. Fourteen gas utilities in the New York-New England area determined they would be forced into severe curtailments by the 1980s unless another supply was obtained. Because 13 of the 14 already purchased their gas through the Tennessee Gas Pipe Line system, they went to Tenneco for help.

"They are buying the gas, and we've got to build the additional facilities to deliver it," says George O. Jackson of Tenneco. "They asked for the gas and they asked us to provide transportation."

Participants in Boundary Gas and their daily volumes include:

NEW YORK-NEW JERSEY AREA	MMcfd
Brooklyn Union Gas Co.	40
Consolidated Edison of New York	40
Long Island Lighting Co.	23
New Jersey Natural Gas	14
National Fuel Gas Supply	9
NEW ENGLAND AREA	
Bay State Gas Co.	18
Berkshire Gas Co.	2
Boston Gas	13
Connecticut Gas Co.	9
Fitchburg Gas and Electric Light	1
Gas Service Inc.	1
Haverhill Gas Co.	3
Manchester Gas Co.	2
Valley Gas Co.	2
TOTAL	177

Boundary Gas filed application with the Economic Regulatory Administration Dec. 19, 1980, for authorization to import 185 MMcfd for delivery to Boundary's 14 customers beginning no earlier than Nov. 1, 1982. Line will have the capacity to handle 300 MMcfd, and TransCanada has applied for an export license for 300 MMcfd over a 10-year period.

Total cost of the project is estimated at $372,571,000 (1982 dollars). Project will include 179.1 miles of 30-in. loops in New York, Massachusetts, Pennsylvania, and New Jersey; 48.6 miles of 42-in.; 8.6 miles of 10-in.; and 25 miles of 12-in. Total compression required is 30,465 hp, with additional facilities including new measurement and regulator stations along the Tennessee Gas system. Proposal was filed with FERC April 22, 1981.

Transco Niagara System

Transcontinental Gas Pipe Line Corp., one of the participants in the New England States line, is one of the major U.S. purchasers of Canadian gas. Transco currently buys gas from Sulpetro and Union Gas Ltd., and Canadian sources may soon account for 20% of Transco's volume.

Transco plans to build a line across New York and Pennsylvania that replaces plans for a line that would have begun beneath Lake Erie. Current project, Transco Niagara Pipeline System, consists of 158 miles of 42-in. Line will begin five miles north of Niagara Falls and terminate at Transco's Wharton-Leidy storage field in north central Pennsylvania. Cost is $402.3 million.

Earlier project, the Lake Erie line supplanted by the Niagara line, would have been 110 miles of large-diameter pipe. Estimated cost was $200 million.

"We believe in the U.S. suppliers but in the future we feel we'll need every possible source of gas," says Barbara Johnson of Transco. "Two-thirds of our market is north of the Potomac River, and Canada provides us with another source of gas supply closer to our customers than the Gulf Coast fields. Really, it'll help all our customers by making more gas available."

Transco has signed an agreement with TransCanada PipeLines calling for delivery of 300 MMcfd for 10 years beginning no earlier than Nov. 1, 1982. Line will transport 1.113 Bcfd, with an ultimate capacity of 2 Bcfd. A compressor station with 38,000-hp will be built at the northern end and a station with 19,000-hp is planned for the southern end.

A portion of the gas will be stored for winter delivery. A total of 40 Bcf of storage capacity will be provided by Union Gas Ltd. in Ontario and by ANR in Michigan. Transportation to and from the outlying storage facilities will be through Union Gas and Great Lakes Gas Transmission Co. systems. **P&GJ**

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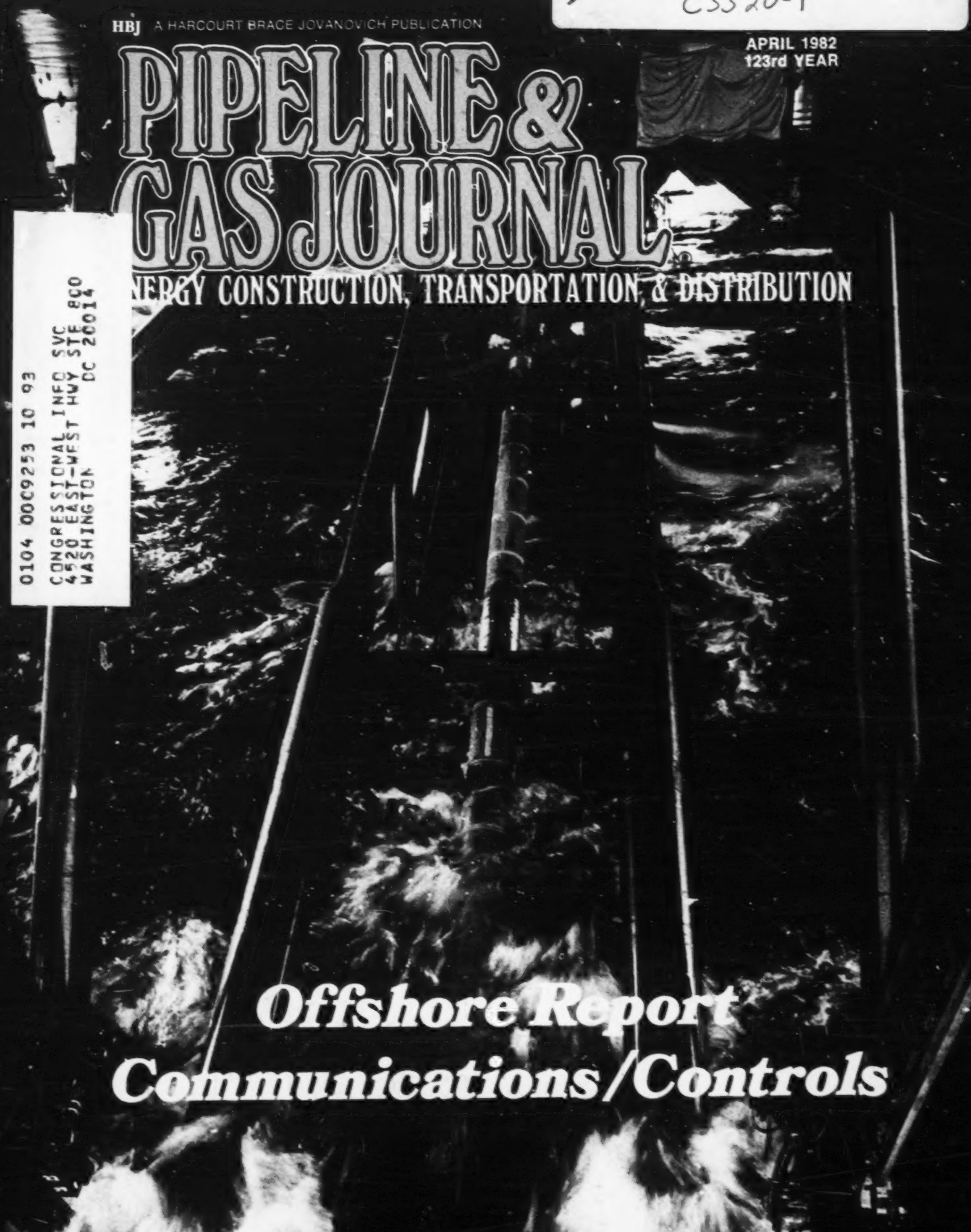

Offshore Report

Communications/Controls

PIPELINE & GAS JOURNAL

International Pipeline & Gas Utility Design, Construction & Operation

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Gas distribution system can profit greatly from proper application of telemetering that permits monitoring and control of city gate stations, district regulator stations, measuring stations, and other facilities.

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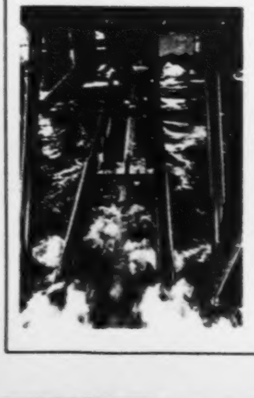

COVER

Pipe comes down ramp of the *Castoro Sei*, the giant semisubmersible deepwater pipelay vessel operated by Saipem S.p.A. and controlled by unique computer programming that compares vessel simulation with pipe simulation. Detailed discussion begins on page 17.

— photo courtesy Saipem S.p.A.

Fourth Quarter Report

Mixed Earnings Reported by Oil and Gas Industry

by Cindy Mays, *Assistant Editor, Energy Management Report*

Oil industry earnings were mixed for the fourth quarter as, once again, companies with major domestic operations recorded profit gains, while those engaged heavily in foreign operations experienced losses.

Higher prices for domestic oil and gas due to oil decontrol helped Atlantic Richfield earn 18 percent more, while Shell rose 12 percent, and Union Oil of California jumped 33 percent.

Because of weak European economies, Gulf Oil earnings dropped one percent, Exxon, 21 percent and Standard Indiana, 8 percent.

The 68 oil companies who participated in our survey show an overall 8.5 percent increase in net income over last year. Profit margin for the group fell from 6.2 percent to 5.5 percent.

American Petrofina's refining and marketing profits were adversely affected throughout the year by reduced levels of operations due to declining demand and compression of margins. Fourth quarter earnings dropped 12 percent.

Oil and gas increases stemming from higher production as well as higher prices for both oil and gas, resulted in a 68 percent increase in net earnings for Noble Affilates.

Natomas posted net earnings of $48.8 million compared to $44.1 million last year mostly from gains in the company's international petroleum, geothermal, petroleum marketing and real estate operations.

Even though Pennzoil's oil and gas division showed an increase, depressed copper and molybdenum prices, combined with lower sulphur sales volumes, offset the gain, causing the 30 percent drop in earnings.

Solid fourth quarter gains in Diamond Shamrock's energy businesses, combined with a good

FOURTH QUARTER GAS COMPANY FINANCIAL REPORTS

	Three months ending December 31**						Twelve months ending December 31**							
	Revenues ($000)			Earnings* ($000)			Revenues ($000)			Earnings* ($000)			Profit Margin	
Company	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980
Alabama Tennessee N.G.	30,263	27,067	+ 11.8	1,651	1,589	+ 3.9	116,805	91,907	+ 27.1	5,786	5,266	+ 9.9	5.0	5.7
American Natural Res.	887,841	813,660	+ 9.1	68,865	62,901	+ 9.5	2,896,008	2,437,686	+ 18.8	154,561	118,236	+ 30.7	5.3	4.9
Arkansas Louisiana Gas	282,333	240,223	+ 17.5	8,386	6,288	+ 33.4	1,179,139	974,510	+ 21.0	87,560	73,427	+ 19.2	7.4	7.5
Columbia Gas	1,351,070	1,057,140	+ 27.8	71,423	57,657	+ 23.9	4,426,243	3,719,921	+ 19.0	190,334	171,346	+ 11.1	4.3	4.6
Consolidated N.G.	810,597	751,748	+ 7.8	37,942	41,446	- 8.5	2,738,164	2,503,054	+ 9.4	131,656	113,008	+ 16.5	4.8	4.5
El Paso Companies	1,128,000	837,000	+ 34.8	39,409	30,534	+ 29.1	3,909,000	3,204,000	+ 22.0	147,257	108,889	+ 35.2	3.8	3.4
Enserch Corp.	853,000	695,000	+ 22.7	43,780	34,807	+ 25.7	3,362,474	2,694,933	+ 24.7	185,513	139,583	+ 34.3	5.5	5.1
Houston N.G.[1]	847,115	653,253	+ 29.7	71,419	54,052	+ 32.1	3,100,172	2,449,754	+ 26.6	255,615	206,848	+ 23.6	8.2	8.4
InterNorth	1,033,220	907,514	+ 13.8	57,417	41,960	+ 36.8	3,655,401	3,037,764	+ 20.3	420,852	209,229	+ 15.1	6.6	6.9
National Fuel Gas	267,766	243,784	+ 9.8	12,308	14,838	- 17.1	912,438	778,439	+ 17.2	27,846	26,970	+ 3.2	3.1	3.5
Northwest Energy	458,151	396,099	+ 15.7	15,823	16,049	- 1.4	1,398,809	1,323,432	+ 5.7	63,767	51,347	+ 24.2	4.6	3.9
Oneok Inc.	353,733	329,143	+ 7.5	15,176	6,808	+ 22.9	1,109,893	943,852	+ 17.6	54,640	42,074	+ 29.9	4.9	4.5
Pacific Lighting	1,006,128	833,075	+ 20.8	18,897	38,017	- 50.3	3,401,489	2,936,937	+ 15.8	117,225	101,129	+ 15.9	3.4	3.4
Panhandle Eastern	803,229	718,143	+ 11.8	48,664	40,588	+ 19.9	3,266,253	2,472,235	+ 32.1	261,604	181,959	+ 43.8	8.0	7.4
Peoples Energy	367,088	287,445	+ 27.7	11,119	9,099	+ 22.2	1,395,259	1,223,434	+ 14.0	29,170	27,952	+ 4.3	2.0	2.3
Pioneer Corp.	317,516	232,053	+ 36.8	25,206	23,962	+ 5.2	1,224,645	911,989	+ 34.3	110,204	90,556	+ 21.7	9.0	9.9
Sonat Inc.	728,047	469,385	+ 55.1	44,643	38,445	+ 16.1	2,629,003	1,798,723	+ 46.2	173,672	147,157	+ 18.0	6.6	8.2
Texas Eastern Corp.	1,242,618	1,155,830	+ 7.5	60,124	58,812	+ 2.2	4,526,114	4,272,854	+ 5.9	224,183	219,757	+ 2.0	5.0	5.1
Texas Gas Trans.	764,851	629,106	+ 21.6	25,981	34,432	- 24.5	2,649,265	2,230,127	+ 18.8	128,684	106,376	+ 21.0	4.9	4.8
Texas Oil & Gas[2]	434,363	344,137	+ 26.2	54,179	40,365	+ 34.2	1,700,749	1,267,187	+ 34.2	205,738	152,222	+ 35.2	12.1	12.0
TransCanada PipeLines	925,455	937,865	- 1.3	42,592	26,339	+ 61.7	3,404,897	3,123,057	+ 9.0	125,573	93,435	+ 34.4	3.7	3.0
Transco Companies	909,446	819,622	+ 11.0	41,286	31,729	+ 30.1	3,525,378	2,627,787	+ 34.2	132,343	112,506	+ 17.6	3.8	4.3
Union Gas Ltd.	279,977	247,056	+ 13.3	8,313	7,974	+ 4.3	934,000	769,103	+ 21.4	22,842	20,462	+ 11.6	2.4	2.6
United Energy Res.	1,507,267	1,113,433	+ 35.4	56,757	48,334	+ 17.4	5,441,604	4,135,342	+ 31.6	215,701	165,454	+ 30.4	4.0	4.0
TOTAL	17,589,074	14,738,781	+ 19.3	881,360	767,025	+ 14.9	62,903,202	51,928,027	+ 21.1	3,472,326	3,685,188	+ 29.3	5.5	5.2

**Excluding non-recurring items. *Earnings available to common stock. [1]Ends October 31. [2]Ends November 30.

FOURTH QUARTER OIL COMPANY FINANCIAL REPORTS

	Three months ending December 31**						Twelve months ending December 31**						Profit Margin	
	Revenues ($000)			Earnings* ($000)			Revenues ($000)			Earnings* ($000)				
Company	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980	% Chg.	1981	1980
Alaska Interstate	100,859	85,977	+ 17.3	8,812	610	+1344.6	360,842	261,652	+ 37.9	41,567	63,141	- 34.2	11.5	24.1
Amarex Inc.	15,059,000	7,030,000	+114.2	1,291,000	720,000	+ 79.3	48,184,000	24,967,000	+ 93.0	4,722,000	2,953,000	+ 60.0	9.8	11.8
Amerada Hess	2,339,424	2,253,822	+ 3.8	48,248	106,603	- 54.7	9,443,630	7,955,490	+ 18.7	212,591	521,642	- 59.2	2.3	6.6
American Petrofina	531,209	616,749	- 13.9	16,989	19,315	- 12.0	2,522,154	2,101,763	+ 20.0	74,140	104,279	- 28.9	2.9	5.0
American Quasar	14,000	12,086	+ 15.8	1,950	148	+1217.6	57,000	44,935	+ 26.8	4,300	4,924	- 12.7	7.5	11.0
Argonaut Energy	2,366	1,047	+126.0	164	96	+ 70.8	5,870[1]	2,648[1]	+121.7	(151)[1]	167[1]			6.3
Argo Petroleum	4,423	4,880	- 9.4	273	1,095	- 75.0	17,811	14,260	+ 24.9	1,867	2,642	- 29.3	10.5	18.5
Ashland Oil	2,409,350	2,030,683	+ 18.6	42,020	14,468	+190.4	9,885,231	8,406,630	+ 17.6	94,592	126,984	- 25.5	1.0	1.5
Atlantic Richfield	7,140,262	7,390,175	- 3.4	469,818	398,279	+ 18.0	28,208,255	24,155,622	+ 16.8	1,671,290	1,651,423	+ 1.2	5.9	6.8
Belco Petroleum	82,333	82,231	+ 0.1	26,366	17,731	+ 48.7	317,098	296,093	+ 7.1	98,350	65,478	+ 50.2	31.0	22.1
Callon Petroleum[2]	3,627	1,898	+ 91.1	327	278	+ 17.6	6,763[3]	4,622[3]	+ 46.3	704[3]	1,625[3]	- 56.7	10.4	35.2
Cities Service	2,226,100	2,090,300	+ 6.5	31,400	117,800	- 73.3	8,659,800	7,577,400	+ 14.6	286,400	488,600	- 41.4	3.3	6.5
Consolidated Oil & Gas	11,699	8,948	+ 30.7	62	348	- 82.2	48,263	33,909	+ 42.3	5,770	1,230	+469.1	11.9	3.6
Crown Central Petr.	412,490	313,748	+ 31.5	14,865	3,868	+284.3	1,487,299	1,266,898	+ 17.4	3,362	19,147	- 82.4	0.2	1.5
Diamond Shamrock	872,548	848,704	+ 2.8	59,733	54,577	+ 9.5	3,376,215	3,145,394	+ 7.3	230,156	213,246	+ 7.9	6.8	6.8
Dyco Petroleum	13,759	10,082	+ 36.5	4,624	2,914	+ 58.7	49,182	32,377	+ 51.9	14,992	8,503	+ 76.3	30.5	26.3
Eagle Exploration	217	252	- 13.9	(122)	35		2,157	2,919	- 26.1	199	40	+501.7	.1	
Exxon	29,583,000	29,759,000	- 0.6	1,065,000	1,340,000	- 20.5	114,989,000	110,381,000	+ 4.2	5,565,000	5,650,000	- 1.5	4.8	5.1
Freeport McMoRan	199,754	190,322	+ 5.0	30,567	38,475	- 20.6	835,404	701,552	+ 19.1	158,972	161,870	1.8	19.0	23.1
General American	85,645	75,765	+ 13.0	18,557	10,499	+ 76.7	354,016	273,448	+ 29.5	59,680	54,131	+ 10.3	16.9	19.8
Getty Oil	3,472,840	2,966,250	+ 17.1	216,503	211,103	+ 2.6	13,251,560	10,436,827	+ 27.0	856,865	871,866	- 1.7	6.5	8.4
Gulf Energy & Develop.	17,652	18,685	- 5.5	2,821	1,829	+ 54.2	60,132	50,486	+ 19.1	7,407	6,088	+ 21.7	12.3	12.1
Gulf Oil Corp.	7,957,000	7,621,000	+ 4.4	301,000	304,000	- 1.0	30,461,000	28,808,000	+ 5.7	1,231,000	1,407,000	- 12.5	4.0	4.9
Helmerich & Payne	95,779	66,217	+ 44.6	23,196	15,398	+ 50.6	343,402	230,903	+ 48.7	83,057	52,167	+ 59.2	24.1	22.5
Holly Corp.[4]	129,794	99,939	+ 29.9	5,398	1,675	+222.3	419,438	410,540	+ 2.2	5,672	9,181	- 38.2	1.4	2.2
Inexco Oil	62,621	39,220	+ 59.7	9,596	5,190	+ 84.9	238,738	146,606	+ 62.8	31,921	22,576	+ 41.4	13.4	15.4
KEBA Oil & Gas[2]	162	153	+ 5.8	(8)	22		927	452	+105.1	140	14	+900.0	15.1	3.1
Kerr-McGee Corp.	1,072,719	949,371	+ 13.0	65,999	51,791	+ 27.4	3,826,420	3,477,881	+ 10.0	211,117	182,223	+ 15.9	5.5	5.2
Louisiana L&E	342,791	305,100	+ 12.4	18,533	48,227	- 61.6	1,227,539	1,075,771	+ 14.1	145,229	180,162	- 19.4	11.8	16.7
Mapco Inc.	585,671	532,864	+ 9.7	31,114	28,969	+ 7.4	2,182,463	1,769,740	+ 23.3	96,890	122,260	- 20.8	4.4	6.9
Marathon Oil	2,637,157	2,420,748	+ 8.9	40,054	55,273	- 27.5	9,814,665	8,754,198	+ 12.1	343,059	379,016	- 9.5	3.5	4.3
Marion Corp.	104,920	137,986	- 24.0	(2,142)	7,317		455,342	470,266	- 3.6	1,607	22,420	- 92.8	0.4	4.8
Mesa Petroleum	99,398	86,747	+ 14.6	28,120	33,979	- 17.2	407,744	372,363	+ 9.5	106,379	95,236	+ 11.7	26.1	25.6
Mobil Corp.	18,024,000	17,388,000	+ 3.7	588,000	558,000	+ 5.4	68,516,000	63,726,000	+ 7.5	2,434,000	2,813,000	- 13.5	3.6	4.4
Moran Energy	26,128	19,968	+ 30.8	4,818	3,857	+ 24.9	100,499	67,123	+ 49.7	19,545	12,187	+ 60.4	19.4	18.2
Murphy Oil	702,534	538,239	+ 30.5	41,396	45,610	- 9.2	2,561,228	2,017,937	+ 26.9	165,944	150,547	+ 10.2	6.5	7.5
Natomas	441,359	333,559	+ 32.3	48,807	44,083	+ 10.7	1,582,396	1,286,104	+ 23.0	232,527	208,370	+ 11.6	14.7	16.2
Noble Affiliates	106,166	71,246	+ 49.0	21,972	13,092	+ 67.8	388,918	276,561	+ 40.6	80,281	47,199	+ 70.1	20.6	17.7
Occidental Petroleum	4,469,354	3,179,605	+ 40.6	164,636	131,153	+ 25.5	14,707,543	12,476,125	+ 17.9	673,051	680,071	- 1.0	4.6	5.5
Oxoco	12,723	3,424	+271.6	2,768	157	+1163.1	28,340	11,917	+137.8	5,564	1,539	+261.5	19.6	12.9
Patrick Petroleum[5]	41,742	16,839	+147.9	4,031	1,359	+196.6	65,655[3]	29,061[3]	+125.9	5,897[3]	1,586[3]	+271.8	9.0	5.5
Patton Oil	724,726	614,495	+ 17.9	(73,939)	(21,716)		3,421,085	3,110,389	+ 10.0	326,780	684,648	- 52.2	9.6	22.0
Pennzoil Co.	652,982	659,422	- 1.0	53,702	76,384	- 29.7	2,681,751	2,483,015	+ 8.0	217,251	304,076	- 28.6	8.1	12.2
Petro-Lewis	53,829	46,314	+ 16.2	5,175	9,045	- 42.8	110,170[3]	87,065[3]	+ 26.5	12,248[3]	17,238[3]	- 29.0	11.1	19.8
Phillips Petroleum	4,091,181	3,874,418	+ 5.6	186,526	286,973	- 35.0	16,287,753	13,712,879	+ 18.8	879,364	1,069,614	- 17.9	5.4	7.8
Prairie Producing	7,470	6,510	+ 14.7	1,200	882	+ 36.0	30,405	21,927	+ 38.7	3,920	4,256	- 7.9	12.9	19.4
Quaker State	229,177	222,065	+ 3.2	6,747	5,463	+ 23.5	918,913	832,492	+ 10.4	27,363	25,775	+ 6.2	3.0	3.1
Sabine Corp.	46,749	34,740	+ 34.5	5,628	7,008	- 19.6	172,670	124,114	+ 39.1	28,342	25,142	+ 12.7	16.4	20.2
Shell Oil	5,193,000	5,130,000	+ 12.3	458,000	409,000	+ 11.9	21,739,000	19,959,000	+ 8.9	1,701,000	1,542,000	+ 10.3	7.8	7.7
Southland Royalty	99,054	89,491	+ 10.7	9,368	9,924	- 5.6	400,139	366,571	+ 9.2	36,689	62,289	- 41.1	9.2	17.0
Southwestern Energy	13,315	12,712	+ 4.7	2,286	2,798	- 18.3	54,756	47,959	+ 14.2	11,856	10,253	+ 15.6	21.7	21.4
Standard California	11,900,000	10,800,000	+ 10.2	571,000	615,000	- 7.2	45,200,000	41,600,000	+ 8.7	2,380,000	2,400,000	- 0.8	5.3	5.8
Standard Indiana	7,730,000	7,697,000	+ 1.1	336,000	366,000	- 8.2	31,613,000	27,832,000	+ 13.6	1,771,000	1,841,000	- 3.8	5.6	6.6
Standard Ohio	3,704,400	3,062,600		477,800	475,800		13,810,900	11,345,600		1,946,900	1,811,200			
Sun Co.	4,400,000	4,100,000	+ 7.3	448,000	30,000	+1393.3	16,000,000	13,200,000	+ 21.2	1,076,000	723,000	+ 49.0	6.7	5.5
Superior Oil	560,547	440,720	+ 27.2	73,225	97,203	- 24.7	2,057,419	1,497,695	+ 37.4	361,291	334,458	+ 8.0	17.6	22.3
Supron Energy	19,913	19,979	- 0.3	5,242	6,406	- 18.2	77,986	66,266	+ 17.7	20,663	20,093	+ 2.8	26.5	30.3
Tenneco	4,292,000	3,641,000	+ 17.9	260,000	200,000	+ 30.0	15,462,000	13,226,000	+ 16.9	813,000	726,000	+ 12.0	5.3	5.5
Tesoro	660,820	865,700	- 23.7	20,811	21,102	- 1.4	2,864,690	3,421,862	- 16.3	73,100	84,200	- 13.2	2.6	2.5
Texaco	14,700,000	14,100,000	+ 4.1	507,000	500,000	+ 1.2	59,400,000	52,500,000	+ 13.1	2,310,000	2,240,000	+ 3.1	3.9	4.3
Tribune Oil	470	339	+ 38.6	200	121	+ 65.3	2,260	1,722	+ 31.2	745	583	+ 27.8	33.0	33.9
Union California	2,911,200	2,693,800	+ 8.1	236,000	177,200	+ 33.2	11,296,200	10,472,500	+ 7.9	791,400	647,000	+ 22.3	7.0	6.2
Universal Resources[5]	17,282	11,401	+ 51.6	3,679	2,352	+ 56.4	63,707	38,899	+ 63.7	13,601	7,222	+ 88.3	21.3	18.6
Vanderbilt Energy	2,050	1,612	+ 27.2	45	180	- 75.0	5,688	4,193	+ 35.7	318	648	- 50.9	5.6	15.5
Wainoco Oil	11,862	10,431	+ 13.7	(1,362)	1,967		44,554	36,009	+ 23.7	(3,674)	7,051			19.6
Westcoast Petroleum	10,875	8,336	+ 30.5	2,316	2,507	- 7.6	38,587	33,220	+ 16.2	6,729	8,841	- 23.9	17.4	26.6
Wiser Oil	14,737	17,074	- 13.7	4,690	6,715	- 30.2	62,516	61,028	+ 2.4	17,824	18,240	- 2.3	28.5	29.9
Woods Petroleum	22,900	15,063	+ 52.0	8,632	4,474	+ 92.9	71,969	53,983	+ 33.3	21,897	14,893	+ 47.0	30.4	27.6
TOTAL	163,615,123	147,777,051	+ 10.7	8,355,196	7,702,011	+ 8.5	,633,326,417	545,767,261	+ 16.0	34,835,618	33,986,500	+ 2.5	5.5	6.2

**Excluding non-recurring items. *Earnings available to common stock. ()Loss. [1] Nine months. [2] Ends November 30. [3] Six months. [4] Ends July 31. [5] Ends October 31.

performance from chemical operations during the first nine months increased earnings from $54.5 million to $59.7 million.

Vanderbilt Energy's 75 percent drop in income was due primarily to higher exploration costs, windfall profits taxes and high interest rates.

Higher interest rates due to higher outstanding debts from drilling activities and property acquisitions drove Petro-Lewis' earnings down 43 percent.

Moran Energy's 24 percent increase is attributed to increased production of oil and natural gas, higher natural gas prices, maximum drilling rig utilization and increased contract drilling margins.

An increase in oil, gas and equipment sales accounted for most of Argonout Energy's 71 percent rise in net income.

Of the 24 gas companies responding to our survey, 79 percent reported an increase in net earnings. Overall, the group's net income rose 15 percent in the fourth quarter.

Peoples Energy earnings rose 22 percent due to a recent rate increase and colder weather.

Higher oil, natural gas and natural gas liquids production as well as higher average selling prices accounted for Enserch's increase in net income from $34.8 million to $43.8 million.

El Paso Company's 29 percent increase is a result of higher profits from gas and oil production as well as increased earnings from interstate gas transmission activities and natural gas liquids operations.

Warmer weather, absence of LNG earnings and the recession combined to cause Consolidated Natural Gas earnings to drop to $39 million from $42.8 million.

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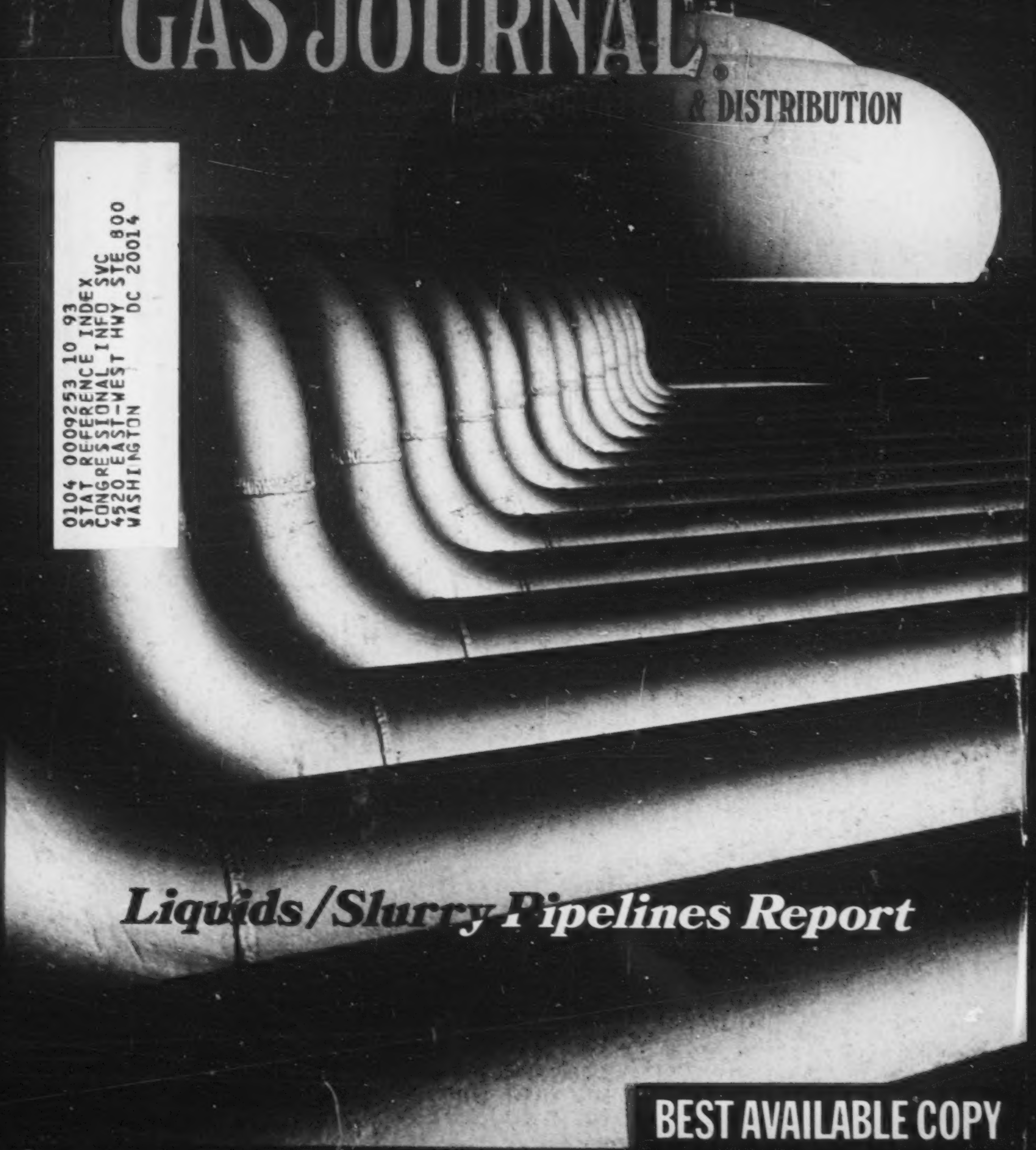

Liquids/Slurry Pipelines Report

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Slurry Pipeline Project Prospects 26

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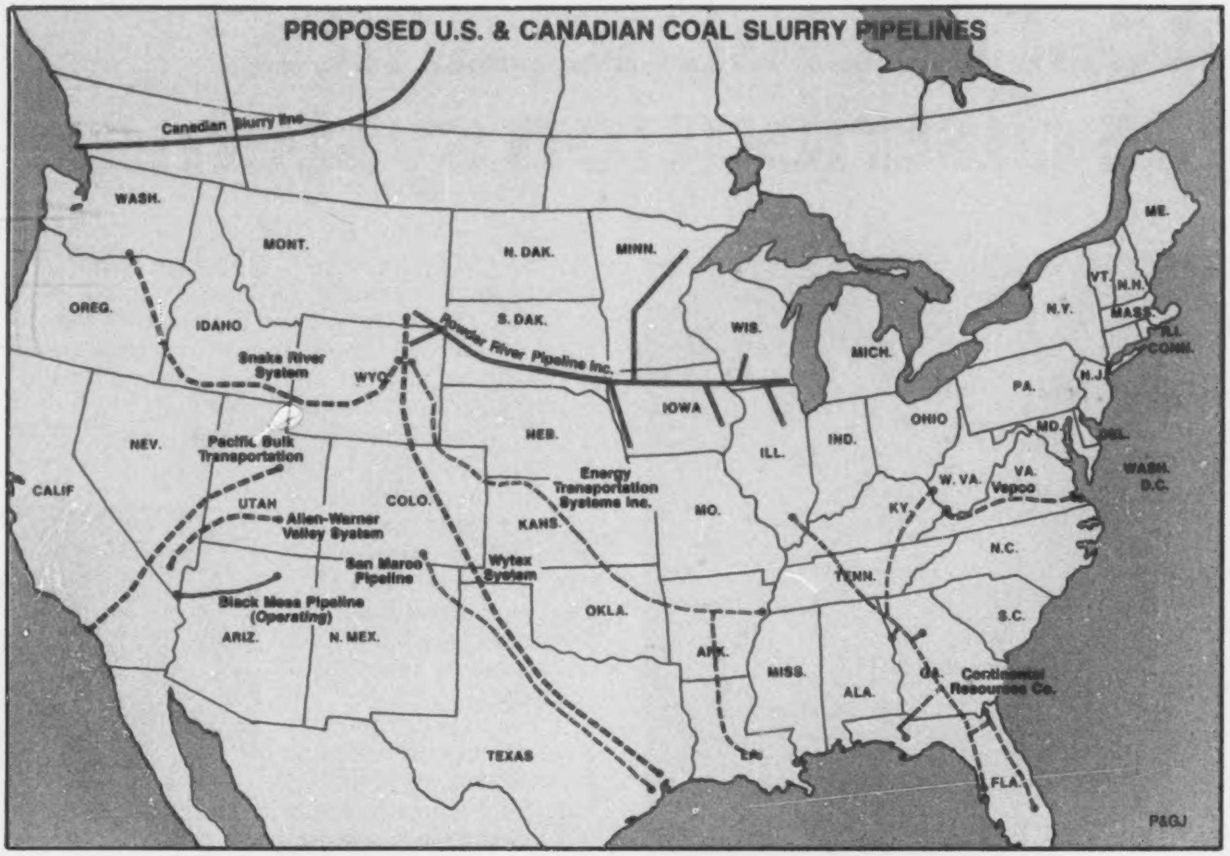
COVER

Oil and its products account for nearly 60% of U.S. energy requirements ... and nearly all of it moves through liquids pipelines at some time or another.

– photo courtesy Williams Brothers Pipe Line Co.


PROPOSED U.S. & CANADIAN COAL SLURRY PIPELINES
Canadian Slurry line
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IDAHO
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Powder River Pipeline Inc.
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MICH.
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VT.
N.H.
MASS.
R.I.
CONN.
Snake River System
WYO.
IOWA
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Legislative Moves Will Help Slurry Pipeline Project Prospects

by Dean Hale, *Editor*

Activity in the coal slurry pipeline area continues to grow as proponents of slurry pipeline transportation and ultimate users of the transportation services that slurry lines would provide push to get vitally needed projects underway.

Much of that push revolves around two major concerns where favorable legislation is needed – the right of eminent domain via federal legislation (giving coal slurry pipelines the same right of eminent domain as that granted to natural gas pipelines) and rights to obtain water supplies that are fair and equitable.

Two bills continue to move, albeit slowly, in the Congress. In the Senate, in early May, hearings were held by the Energy and Natural Resources Committee, whose chairman is Sen. James McClure (R-Idaho), on S.1844 – the Coal Distribution and Utilization Act. Additional hearings will be held in early June by the same committee on the water issues related to the bill.

In the House of Representatives, H. R. 4230, the Coal Pipeline Act, has been passed by the Surface Transportation Subcommittee of the Public Works Committee and is presently waiting on an actual vote by the full Public Works Committee, which is chaired by Rep. Jim Howard (D-N.J.).

Both bills are the targets of incessant lobbying by railroad interests that are opposed to competitive forms of transport. Slurry pipeline proponents are quick to point out that recent railroad deregulation and large mergers and proposed mergers are eliminating most of the rail competition in the U.S. – and without competition, there is little effective price moderation available on transportation costs.

Both bills before the Congress include very protective language to protect the water rights of the various states and reserve questions of water rights and access to water to the states.

The Slurry Transport Association, in its educational programs, continues to emphasize that there will be much more emphasis in the future on coal production and utilization and export of coal, and that there must be greater awareness of the need for competition in the coal transportation area.

Currently, there are 10 coal slurry pipeline projects proposed for the U.S. plus one project in Canada, and these total 10,896 miles of pipelines. The planned, proposed, and under-study lines are detailed in the accompanying table.

Energy Transportation System, Inc. has reached some major goals in the past year, with a major achievement being the signing of an agreement with the state of South Dakota for the purchase of 50,000 acre-feet of water from the Oahe Reservoir in South Dakota. The agreement, effectively, assures a secure 50-year water supply for the life of the ETSI coal slurry pipeline project.

To take water from Oahe Reservoir near Pierre, S. Dak., to ETSI's coal slurry preparation plant near Gillette, Wyo. will require a 267-mile water pipeline that will also supply water to communities and rural water districts in western South Dakota. ETSI will transport 4300 acre-feet of water each year free of charge to those communities and districts. It will also provide up to $200,000 in technical assistance on water supply problems to other western South Dakota communities.

A final environmental impact study conducted under the leadership of the

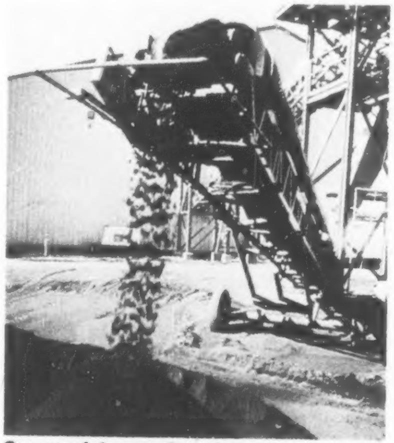
U.S. & Canadian Coal Slurry Pipelines

Company	Miles	Sizes (In.)	From	To	Estimated Cost ($Millions)	Status	Contractor or Engineering Co.	Annual Tonnage (Millions)
Alberta Economic Development, Energy & Natural Resources Ministries	500	Unk.	Hinton, Alberta	West Coast Port	–	Planned	Fluor (E)	N.A.
Allen-Warner Valley Energy Systems (Nevada Power Co.)	183 73	20, 22 9, 12	Alton, Utah Alton, Utah	Allen Station Warner Valley, Utah	$270 –	Planned Planned	Engineering Management, Inc. (E)	9.1 2.5
Coalstream Pipeline Co. (Continental Resources Inc.)	1500	24-48	Kentucky	Florida	$3000	Planned	Fluor (E)	55
Energy Transportation Systems Inc.	1387	38	Wyoming	Baton Rouge, La.	$2000	Planned	Bechtel (E)	37
Pacific Bulk Transportation Systems (Boeing Engineering & Construction Co.)	650		Emory, Carbon counties, Utah	Oxnard, Calif.	$500	Planned	Boeing (E)	10
Powder River Pipeline Inc.	1923	42	S.E. Montana	Great Lakes areas, other terminals	$2500	Planned	–	36
San Marco Pipeline Co. (Houston Natural Gas, Rio Grande Industries)	900	20, 24	S.E. Colorado	Texas Gulf Coast	$800	Planned	–	15
Snake River System (N.W. Energy, Gulf Interstate)	1100	20, 24	N.E. Wyoming	Idaho, Oregon	$500	Planned	–	10
Tesoro Petroleum Corp.	1000	30	Kentucky	Southeastern U.S.	$1000	Planned	–	N.A.
Virginia Electric Power Co.	420	12-36	Proud, W.V.	Portsmouth, Va.	$250	Planned	–	10
Wytex System (Texas Eastern, Brown & Root)	1260	36, 40	Powder River basin, Wyo.	Houston area	$1800	Planned	Brown & Root (E)	22

Bureau of Land Management was produced and provided a very positive assessment of the ETSI system. It found coal slurry pipelines to be a safe means of transportation that has little effect on the environment and said coal slurry pipelines cause the lease possible risk to public safety of all coal transportation alternatives.

ETSI's coal evaluation plant, in operation at White Bluff, Arkansas since November 1981, has confirmed that the design basis for the ETSI line is sound. Grinding mills produced pipeline slurry using Powder River Basin coal with minimum dust emission by use of a wet collection system after the cage mills. At the dewatering end, ETSI's tests confirmed the estimate that the primary dewatering centrifuge would produce about 40 tons of dry coal per hour. Water clarity was excellent and the water from the process will meet federal and state water purity standards before the slurry water is released to public streams.

ETSI plans to route the pipeline through the northeast corner of Colorado. After serving power stations in Oklahoma, the pipeline will head east into Arkansas and split into two branches near Little Rock. One branch will terminate at Independence and the southerly branch will end at Cypress Bend on the Mississippi River, where a barge loading terminal will be built to permit shipping of dewatered coal to powerplants in Louisiana.



Successful operation of the coal evaluation plant at White Bluff, Ark. was recent highlight of operations reported by Energy Transportation System, Inc., which plans to build a 1387-mile coal slurry pipeline from Wyoming to Arkansas and Louisiana.

ETSI's construction schedule is "on schedule." A basic engineering design has been completed. Construction is expected to begin in 1983 so that the first phase of the line can be completed and initial coal deliveries begun in 1985. The line is expected to be in full operation in 1986.

Nevada Power Co.'s Allen-Warner Valley Energy System has undergone some major changes and revisions. The Alton coal slurry pipeline is one of five major components of the energy system, and has the approval of the Secretary of Interior for pipeline right-of-way in Utah, Arizona, and Nevada. The line is being designed by Engineering Management, Inc., under direction of Black Mesa Pipeline. EMI currently is conducting preliminary engineering and environmental studies.

Two separate lines are planned to meet changed conditions. The Allen Station line will have 164 miles of 22-in. and 19 miles of 20-in. pipeline, capable of delivery of 9.1 million tons annually to the Allen Station near Las Vegas, Nev. The Warner Valley Station line will have 68 miles of 12-in. (that will parallel the 22-in. line) and 5 miles of 9-in. line, capable of delivering 2.5 million tons per year to the Warner Valley Station.

Powder River Pipeline Co., Inc. has a four-phase project underway. Phase I includes a feasibility study that is to be completed by July 1982. Phase II will involve the addition of other participants to the project and is to be completed by early 1985. Construction will be initiated in Phase III and is to be completed by 1987 at a cost of $2.5 billion. Phase IV involves operation in 1986.

Virginia Electric Power Co. has completed studies on four alternative routes ranging from 400 to 465 miles in length, and involving pipe sizes from 19 to 43-in. diameter and a system having six or seven pumping stations on the line. Throughputs would range from 5 to 25 million tons per year.

Vepco says the studies indicate, initially, that coal slurry pipelines should be feasible in moving its coal requirements from mines to power plant sites.

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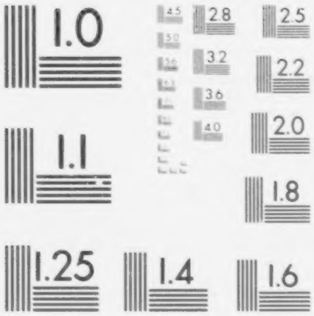
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